Treatment of non-hazardous industrial waste to obtain Biocompost

Document prepared by POLARIS NETWORK ESPAÑA SL

Project Document Template (Version 2.0)	
Name of the project	Treatment of non-hazardous industrial waste to obtain Biocompost
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Project holder	WORMS ARGENTINA S.A.
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Project participants	WORMS ARGENTINA S.A.
Version	3
Date	04/07/2024
Project type	BIOCOMPOST

Project Document Template (Version 2.0)	
Grouped project	not applicable
Applied Methodology	The methodology used to calculate CO_2 emission savings is a UN CDM methodology: AMS.III.F, Avoid methane emissions through composting, Version 12.0 - Sectoral scope(s): 13.
Project location (City, Region, Country)	Country: Argentina Region: Santa Fe City: Arroyo Seco
Starting date	01/04/2018
Quantification Period of GHG emissions reductions	01/04/2018 to 31/03/2028
Estimated total and average annual GHG emission reduction amount	123,298.63 ton CO_2 total in 10 years, (12,329.86 ton CO_2 average annual)
Sustainable Development Goals	9. Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation. 11. Make cities and human settlements inclusive, safe, resilient and sustainable. 12. Ensure sustainable consumption and production patterns. 13. Take urgent action to combat climate change and its impacts.
Special category, related to co-benefits	not applicable

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1 Project eligibility

1.1 Scope

The scope of the BCR Standard is limited to:	
The following greenhouse gases, included in the Kyoto Protocol: Carbon Dioxide (CO2), Methane (CH4) and Nitrous Oxide (N2O).	X
GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to GHG removal activities and REDD+ activities (AFOLU Sector).	
Quantifiable GHG emission reductions and/or removals generated by the implementation of GHG removal activities and/or REDD+ activities (AFOLU Sector).	
GHG projects using a methodology developed or approved by BioCarbon Registry, applicable to activities in the energy, transportation and waste sectors.	X
Quantifiable GHG emission reductions generated by the implementation of activities in the energy, transportation and waste sectors.	X

The project involves reducing the emission of methane into the atmosphere from organic matter (from non-hazardous organic waste from biodiesel, oil and cellulose plants, the dairy industry, breweries and agro-industries that produce GHG) that otherwise, they would have been left to decompose anaerobically in a solid waste disposal site (SWDS) or in an animal waste management system (AWMS), or in a wastewater treatment system (WWTS). Controlled aerobic treatment through biomass composting is introduced in the project activity.

The project activity consists of composting the organic fraction of non-hazardous organic waste from biodiesel, oil and cellulose plants, the dairy industry, breweries and agro-industries that produce GHG. It does NOT involve any of the below:

- Recover or combust landfill gas from disposal site.
- Undertake controlled combustion of the waste that is not treated biologically in a first step.
- Recover biogas from wastewater treatment.
- Co-digestion of organic matters.

The project applies the methodology outlined in sector 13 of the Clean Development Mechanism (CDM): Waste handling and disposal; specifically, AMS-III.F "*Avoidance of methane through composting"*. This methodology is applicable to the composting of the organic fraction of municipal solids and biomass residues from agricultural or agro-industrial activities, including manure. This methodology includes the construction and expansion of treatment facilities, as well as activities that increase capacity utilization at an existing facility.

The location and characteristics of the biomass, animal manure and composting wastewater disposal site will be known in the baseline condition, in such a way as to allow the estimation of its methane emissions, using the provisions of AMS- III.G, AMS-III.E (related to reserves), AMS-III.D "*Methane recovery in animal manure management systems*" or AMS-III.H, respectively. Mixing materials may be added in the project setting to increase the efficiency of the composting process (e.g., to achieve a desirable C/N ratio or free air space value). However, only the amount of solid waste or manure or wastewater diverted from the reference treatment system is used for the emission reduction calculation.

Project activities for animal manure composting will also meet the requirements of section 3 and 4(c) of the latest versions of AMS-III.D. For solid waste diverted from a solid waste disposal site, the following requirement must be verified ex ante at the beginning of each crediting period:

a) Establish that the identified landfills/reserves can be expected to accommodate the waste to be used for the project activity during the crediting period.
b) Establish what is the common practice in the region in disposing of solid waste (landfill)/reserve(s).

Project participants shall clearly define the geographical boundary of the region referred to in paragraph 11(b), and document it in the PDD. When defining the geographical boundary of the region, the project participants must consider the origin of the waste, i.e., if the waste is transported up to 50 km, the region can cover a radius of 50 km around the project activity.

In addition, the distance that the final product will be transported after composting should also be considered. In any case, the region must cover a reasonable radius around the project activity that can be justified with reference to the circumstances of the project but in no case will it be greater than 200km. Once defined, the region should not be changed during crediting periods.

In the event that the compost produced is handled aerobically and subjected to soil application, the appropriate conditions and procedures must be guaranteed (which do not produce methane emissions).

In case the compost produced is thermally/mechanically treated, the provisions of AMS-III.E related to thermal/mechanical treatment.

In the event that the compost produced is stored under anaerobic conditions and/or delivered to a landfill, the emissions of residual organic content will be taken into account and calculated according to the latest version of the methodological tool "Emissions from solid waste disposal sites".

1.2 Project type

Activities in the AFOLU sector, other than REDD+	
REDD+ Activities	
Activities in the energy sector	
Activities in the transportation sector	
Activities related to Handling and disposing of waste	X

1.3 Project scale

Small scale.

2 General description of the project

a- The large amount of non-hazardous, dangerous and pathogenic organic waste in Argentina is estimated at 11,000,000 tons, only 10% is adequately treated. Worms Argentina S.A. efficiently transforms non-hazardous organic waste from biodiesel, oil and pulp plants, dairy industry, breweries and agro-industries that produce GHG in the region. Worms Argentina S.A is certified as a "B Corp" company (a company that measures social and environmental impact and commits itself personally, institutionally and legally to make long-term action decisions in the community and environment).

b- Specific environmental sanitation tasks contribute to the development of a balance between society, business and the environment, Worms Argentina S.A researches and provides viable solutions and sustainable solutions to complex problems such as non-hazardous solid waste by composting this waste.

c- -0-

d- This project is aligned with four SDG:

a. SDG 9. Industry, Innovation and Infrastructure: Promote inclusive and sustainable industrialization and, by 2030, significantly increase the share of industry in employment and gross domestic product, according to national circumstances, and double its share in least developed countries.
b. SDG 11. Sustainable Cities and Communities: By 2030, reduce the per capita adverse environmental impact of cities, including by paying special attention to air quality and municipal and other waste management.
c. SDG 12. Responsible consumption and production: By 2030, substantially reduce the generation of waste through prevention, reduction, recycling and reuse.
d. SDG 13 - Climate action: Continue along the same path in the fight against climate change.

e-

PERIOD	TOTAL EMISSIONS SAVINGS	
1/april/2018-31/march/2019	9,523.06	
1/april/2019-31/march/2020	13,050.84	
1/april/2020-31/march/2021	10,972.24	
1/april/2021-31/march/2022	13,273.77	
1/april/2022-31/march/2023	12,746.06	
1/april/2023-31/march/2024	12,746.53	
1/april/2024-31/march/2025	12,746.53	
1/april/2025-31/march/2026	12,746.53	
1/april/2026-31/march/2027	12,746.53	
1/april/2027-31/march/2028	12,746.53	
TOTAL	123,298.63	tCO_2e

2.1 GHG Project name

Treatment of non-hazardous industrial waste to obtain Biocompost.

2.2 Objectives

Worms Argentina S.A. is dedicated to specific environmental sanitation tasks that seek to contribute to the development of a balance between society, business and the environment, for which it is responsible for researching and providing viable and sustainable solutions to complex issues such as urban solid waste and solid organic waste. Specific environmental sanitation tasks contribute to the development of a balance between society, business and the environment, Worms Argentina S.A researches and provides viable solutions and sustainable solutions to complex problems such as non-hazardous solid waste by composting this waste.

All those purposes are reflected in the B Corp certification and documents, that demonstrate the environmental, legal and social commitment with the community, the environment and itself.

The project objective is to obtain a valuable product at the same time that the carbon footprint of the solid waste treatment is reduced. To multiply the capability of the project to prevent the release of GHG, different protocols have been developed, like vermiculture, that increase the value of the compost generated and also reduce the percentage of GHG.

During the duration of the project the goal is to increase the capability of waste reception and treatment which will result in an increase of the prevent emissions. This increase has only been temporarily affected by the sanitary situation originated by the Covid 19 but it has come back to the original tendency of yearly growth.

2.3 Project activities

The total area of Worms Argentina S.A. is 218,249.68 m^2, of which 114.873,00 m^2 are used for composting. The useful area for composting operations is 70,000 m^2. The process for the reception of waste in a solid aggregation state is summarized in the flow chart:

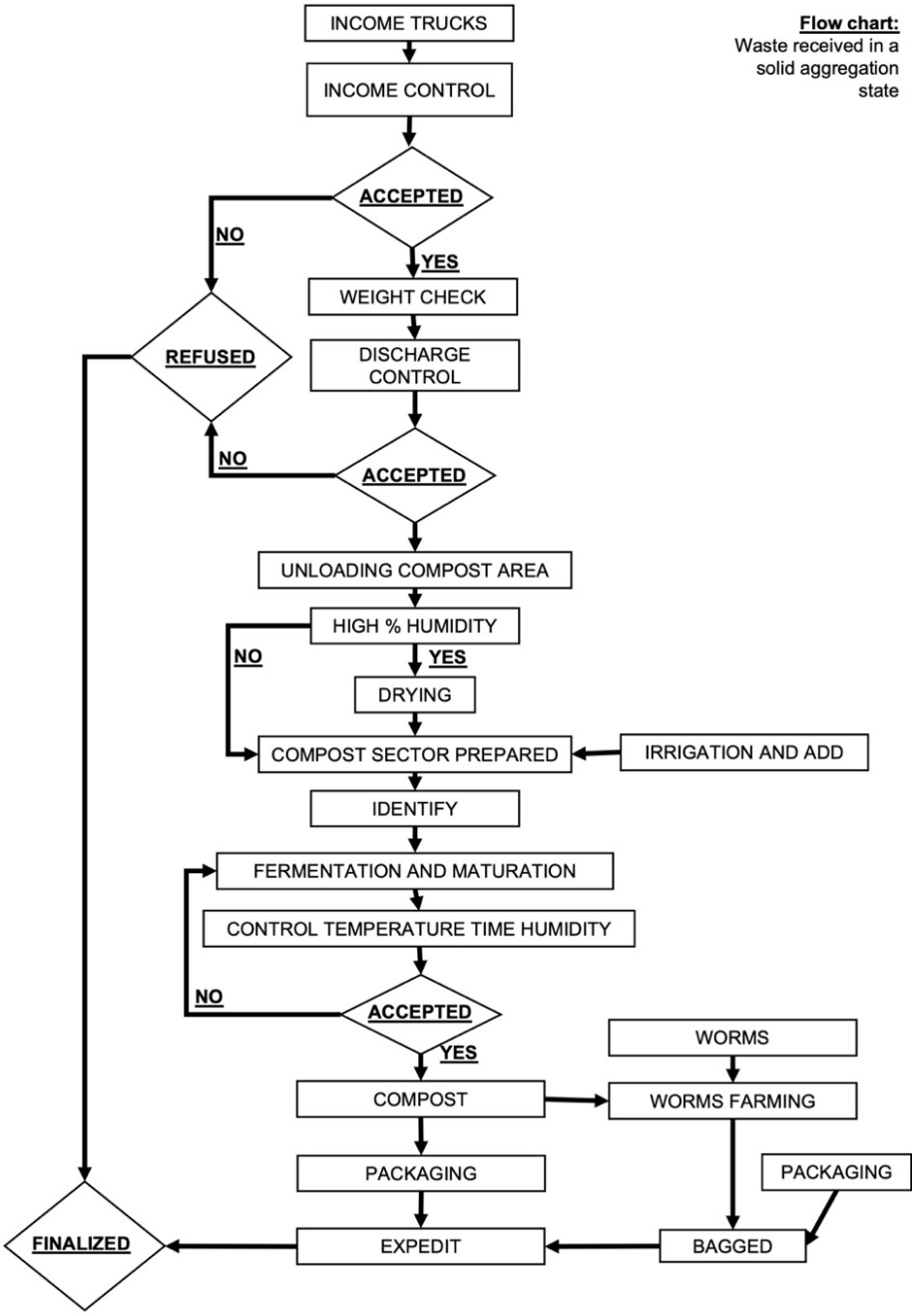

Figure 1. Chart of the process for the reception of waste in a solid aggregation state

Worms Argentina S.A. only accepts the entry of non-hazardous solid waste included in Annex B of Decree Nº 2151/14 from Santa Fe about non-hazardous waste.

They must be accompanied by the corresponding characterization analyzes or a certificate issued by the generator, plus the prior approval of the firm's internal laboratory, for their admission.

If residues with dangerous characteristics or that do not correspond to the characterization reports are detected, the company will not admit their entry.

If improper solids are detected upon entry, after their extraction, the client will be notified and their entry into the plant will be restricted until the measures to prevent their future entry into the system are communicated.

Income Control

At this point, the presence of waste not suitable for treatment in the load, the state of the vehicle and transit permits will be verified.

The scale operator is in charge of recording the data of each vehicle, weighing it, recording the tare weight (if known), charging, generating invoices or receipts and weighing documents, weighing the vehicles after unloading to generate tare weights and manage this part of the operation.

Transport Control

Some of the possible breaches of security measures by carriers and that can be detected at the entrance are: uncovered loads, transport of liquids with runoff, visible content of improper, overweight in vehicles.

When these deviations are detected, the necessary actions will be taken to correct the deviations or reject the load, if applicable.

The acceptance procedure occurs after the verification of all the measurements in the weighbridge area and ends when the transport is authorized to go to the reception tank area.

Download controls

This control is carried out in all cases by the operators who participate in the unloading of the waste once the transport arrives at the unloading sector and is secured for its dumping.

The control basically consists of verifying the appearance and characteristics of the waste at times prior to unloading, that is, at the time the load is lowered from the truck.

The reception operator is monitored by a trained area manager and remains there making visual contact with the waste to be unloaded.

In this instance, in addition to the visual control, the temperature of those wastes that, due to their characteristics, may present advanced fermentation processes is carried out: piles of organic waste, mud or waste that show the emission of vapors or smoke not detected in the control. input, waste with high apparent moisture content. The waste is considered to have unacceptable characteristics if the measured temperature is greater than 55°C.

If any type of residue is observed to have dangerous characteristics, the suspicious material will be isolated and its disposal on the work front will be avoided, informing the transporter and supervisor with the urgency that the case warrants.

Waste with high moisture content

An important part of compostable waste is waste that is easily degradable due to its high moisture content. Sludge from effluent collection systems from livestock establishments are the most common components of this fraction of waste destined for composting.

On the occasions that it is necessary, the Supervisor can define that a certain amount of solids be dried prior to mixing in case of detecting a percentage of humidity higher than usual. To do this, you can spread a limited amount of it in the composting area so that, through the action of air for 24 hours, the moisture content of the waste is reduced by evaporation.

Sector Preparation

To minimize the infiltration of excess liquids into the soil, with a potential negative impact on groundwater, the Company prepares the land where the compost piles are installed according to the characteristics of the substrate, by:

- Soil stabilization with lime: with lime the resistance properties can be improved, it increases the contraction limit and decreases the plastic index.
- Compaction and levelling.
- Armed cribs and mixtures of different substrates.

This operation is carried out each time the composting area is expanded in the lots and prior to using a sector in which the previous composting process has already been completed.

Mix – Field Assembly

Through the operation of a mechanical shovel and the manual work of 2 operators, the field is assembled.

The supervisor indicates the amounts of each waste fraction to be mixed that are recommended to obtain an adequate Carbon/Nitrogen balance in the resulting mass.

To properly determine this mixture, the supervisor is guided by the following table, so that daily work is done with the objective of obtaining a balanced mixture of waste with a C/N ratio between 25 and 40:

DRY BASE			
MATERIALS	C%	N%	C/N
Sawdust	40	0.1	400
Cereal Plant Sweeps	45	0.3	150
Sludge from liquid effluent capture systems and manure from livestock pens or feedlots.	8/15	0.5/0.7	11/30

Based on the preceding data and the experience of the personnel responsible for the operation, the mixtures of the different solid currents received are defined.

The court is set up so that its height does not exceed 2 m and the length is such that it allows taking advantage of the available space in the composting area without mixing piles in different fermentation processes.

Once the daily field is assembled, the fermentation start date is identified and the data required by the control sheets is recorded.

Fermentation and maturation

The temperature of the piles is taken at a depth of no less than 30 cm at points separated no more than 2 m along it using a digital thermometer. The temperature is recorded in the daily composting control sheet.

Ideally, the temperature of the mixture reaches 55°C, to ensure the destruction of weed seeds, pathogens and parasites. The supervisor is notified when the temperature of the mix exceeds 60°C.

Periodically, an operator controls taking a sample to verify the correct humidity of the mixture, to decide if it is necessary to irrigate the controlled pile.

The recommendation throughout the composting process is to turn the piles at least once a week during the first month after the pile is established. Then every 15 to 20 days, as

long as the temperature does not exceed 60°C, in which case it is turned over. The operation is carried out with machinery that is described in the corresponding section.

Composting completion

The total duration of the composting process is variable, depending on several factors, especially the composition of the pile and the C/N ratio achieved in the mixture.

In general, the fermentative processes, characterized by the controlled increase in the temperature of the cell, have a thermophilic stage that ends in the order of 8 weeks.

Meanwhile, based on the experience and the controls carried out in the Worms' piles, a period of the order of 24 weeks is considered as the average time for the completion of the composting period.

For this reason, the period of 6 months has been considered as the indicated one to reflect the mass balance in the solid treatment line. Depending on external conditions (for example: temperature, solar radiation, excess humidity) this period may be somewhat shorter.

This period is considered to be over when periodic temperature checks indicate that the values recorded for a battery have stabilized. At that point, the supervisor decides to remove it to form a pile that occupies a smaller area (and thus optimizes the use of soil resources) and reaches a height of up to 2 meters. At that moment the maturation period of the compost begins.

The maturation of a pile can lasts between 1 and 2 months, a period in which the biological balance of the mass is produced, where a gradual decrease in the temperature of the material should be observed. With the current rotation, this period usually doubles these times, ensuring their stabilization.

During this time, controls of the material's temperature continue to be carried out and it must be reported if there are increases that indicate that the fermentation process has not been completely completed. In these cases, the battery must be removed to promote ventilation and avoid unwanted increases in temperature.

The supervisor defines the moment of completion of the process by sensory review of the product (smell, color, granulometry, percentage of structuring agent). A dark brown or black homogeneous mass should be obtained, without an unpleasant odor.

Periodically, the company proceeds to carry out analyzes of the compost obtained, once the stabilization stage has been completed.

The compost obtained through this procedure is stored in big-bags or shipped in bulk and marketed as a soil improver.

An analyzed fraction of this compost, in turn, can be derived to the vermiculture area.

Control of possible leachates

Due to the operational controls implemented, aimed at maintaining a humidity between 60-70% during the fermentation process, with controlled parameters, this phenomenon is considered extremely possible, which should not occur under normal operating conditions.

However, the eventual generation of leached liquids has been foreseen as a result of composting piles that could have excess moisture in the processed materials, or due to some anomaly in the degradation process or rainfall regime.

For this purpose, the company has requested the corresponding overturning permit, the feasibility of which has been granted by the Enforcement Authority (attached), for which the overturning conditions established in RESOLUTION No. 1089/82 REGULATION FOR THE CONTROL OF THE DISCHARGE OF RESIDUAL LIQUIDS. Once contained, the leached liquids are pumped to the liquid pools, recirculating through the process line, stabilizing parameters and avoiding the loss of biomass.

In any case, due to the characteristics of the materials entered or processed, it is ensured that the levels of metals or other contaminants in the leachate are low or zero, and a high microbial concentration is maintained as a result of the biological processes that occur in the pile.

The company has projected improvements in the perimeter channeling in case of extreme rains, and its execution will allow the optimal use of liquids from the composting process.

The projected work involves improvements to a perimeter channeling network for every 5,000 m^2 of surface area occupied by composting piles. This network of canals with open sections of compacted and waterproofed soil 50 cm wide and 30 cm deep, and with sections for circulation of machinery or personnel with perforated PVC pipes.

The channels flow down a gentle slope of 1-5% towards a plastic collection chamber of 1 m^3 for each 5,000 m^2 network. Submersible pumps will be able to recover the leachate collected for recirculation to the composting piles.

The capacity of each sector of the network is 45 m^2, with a total capacity of 630 m^3, which is equivalent to the consumption of 5 days of water for irrigation.

Vermiculture

A shed has been installed to carry out indoor vermiculture tasks, with controlled ambient temperature conditions and adequate lighting. The dimensions of the Vermiculture area are 35 m x 30 m and it shares infrastructure in the same Warehouse with the Laboratory.

The roofs of these buildings function as rainwater collectors that are used in the irrigation process.

Operational controls

Varying amounts of Compost processed in compliance with the methodology described above are used for the vermiculture process.

Figure 2. Picture ofthe process of compost with vermiculture in WORMS SA.

The Californian-type worms are deposited on the material destined for the vermiculture cradles, which when fed with this material transform it into a product rich in substances such as Nitrogen, Potassium, Phosphorus, etc., in addition to presenting a texture that favors its use in improvement of arid or impoverished land.

As the vermicompost or vermicompost is being produced, it is sieved to separate undesirable materials (such as grass or stones), it is homogenized and it is packaged in bags according to the destination that will be given to the product.

Figure 3. Picture of California Worms used in WORMS S.A.

For these steps there is infrastructure and machinery listed in the equipment section.

The Company has a Laboratory that fulfills the functions of:

- controls of the materials entered
- quality controls of products for soil amendment
- production of *Trichoderma harzianum* to improve the composting process and the quality of the products.

Trichoderma harzianum is a fungus that is also used as a fungicide. It is used in foliar applications, seed and soil treatment to control various diseases caused by fungi. In the compost, it fulfills the function of inhibiting the development of pathogens that harm the process and cause bad odors.

In the finished product, the presence of this fungus in the soil improver collaborates in the development of crops by stimulating the defense mechanisms of plants against pathogens that affect their development.

PRODUCTION QUALITY: REGULATORY FRAMEWORK

To guarantee the quality of the production of Worms Argentina S.A. control procedures are carried out by performing chemical and bacteriological analyses. Documented

information referring to the inscriptions of the products of Worms Argentina S.A. is attached hereto, used as soil amendment by Servicio Nacional de Sanidad y Calidad Agroalimentaria (SENASA).

The company gradually incorporates into its practices the guidelines of Joint Resolution Nº 1/2019 (RESFC-2019-1-APN-SECCYMA#SGP) issued by the NAC SERVICE OF HEALTH AND AGRO-FOOD QUALITY and the SECRETARY OF ENVIRONMENTAL CONTROL AND MONITORING of the Nation that approves the REGULATORY FRAMEWORK FOR THE PRODUCTION, REGISTRATION AND APPLICATION OF COMPOST.

However, it is necessary to sanction a provincial rule that adopts it in the local legal system (or one that establishes the conditions for regulating the activity at the Provincial discretion), as well as the adaptation and updating of regulations by SENASA.

Notwithstanding this, to date the firm is in the process of managing a new application for registration in the National Registry of Fertilizers, Amendments, Substrates, Conditioners, Protectors and Raw Materials within the framework of this Resolution.

Treatment of waste received in a state of solid aggregation.

Recovery technologies applied in the process:

- Segregation, recovery and revaluation of recyclable materials.
- Composting and vermiculture of the organic fraction of organic waste from agricultural and industrial origin.
- Biological Treatment of Organic Waste.

Calculation of operating capacity.

Proportion of income streams over the total:

Income Streams	Percentage
Filter soils	19 %
Livestock sludge and sludge from livestock farming	11 %
Slurry	5 %
Dust and cereals	58 %
Others	7 %

COMPOSTABLE SURFACE

Compost pile dimensions	
Width (m)	3,20
Tall (m)	1,20
Length (m)	145
Volume	556,8
Separation between piles (m)	2 – 2,5
Number of possible courts	80
Average density (t/m^3)	0,7 – 0,9
Average treatment time	180
Truck capacity	14
Average Truck Income	7

Products obtained from the transformation process, potential uses and marketing.
The current production capacity is:

Product	Quantity	Destiny
Fatty acids/oils	653,4 t/month prom.	Sale of the domestic market and export to industrial input.
Humus (Bags and bulk)	134 t/average semesters	Sale in the domestic market/stock
Liquid Humus (liquid organic amendment)	60 t/average semesters	Sale in the domestic market/stock
Compost (bags and bulk)	288 t/average semesters	Sale in the domestic market/stock
Black earth	7951 t/average semesters	Filling and leveling on the property, substrate for new compost piles, input for lombricultur.
Recovered water for irrigation	1588 t/average semesters	Input for composting piles

Maximum processing capabilities

Based on the calculations of the operating capacity and current proportions of waste streams, considering the surface still available for compost piles and the installed capacity in tanks and pools, as well as the average processing times for each stream, it is estimated that the capacities capacity of the plant is in the order of 40% above the current operating capacity, resulting in:

Residual currents that enter in a state of solid aggregation.

Current average		Maximum capacity
2450.82	total tons average monthly income	3431.14
98.03	average total tons daily income	137.25

Mobile machinery:

- 1 Forklift DAEWO 325 2,5 t
- 1 Patent PSE 126
- 1 Double-axle semitrailer Patent AVT 175
- 1 IVECO 6x2 truck with skip
- 1 MAZDA truck with van Patent VAV 652
- 1 Mercedes Benz 1114 truck with hydro crane Patent UZL 866
- 1 Mercedes Benz 1114 truck with tank Patent VTI 043
- 1 Truck Mercedes Benz 1114 tractor Patent WVG 642
- 1 Truck Mercedes Benz 1634
- 1 Volkswagen truck Vw 17280 tractor Patent AC 174 YS
- 1 Agricultural cart with rails
- 1 MERCOMETAL 1-shaft mixer wagon
- 1 2-axle hopper car
- 1 Farmi Forest chipper with Bedford engine
- 1 MAINER Sorter
- 1 ASTARSA mini loader
- 1 2-axis mixer with Techno car M9000 scale
- 1 ASTARSA Motor Grader
- 1 ASTARSA 936 loader 2 m3
- 2 Backhoe loader - Astarsa - 868
- 1 Tractor FARMATRAC 60/90
- 1 HANOMAC Tractor
- 2 Tractor Masey Fergusson MF 4275
- 1 Pauny RSO EVO Tractor

Laboratory:

- Magnetic stirrer
- Orbital shaker
- Wolter agitator
- Autoclave
- Analytical balance
- Heating iron battery
- Vacuum pump
- Sterilizing hood
- Digital centrifuge
- Distiller
- Stove drying sterilization
- Freezer
- Orbital magnifier
- Microscope
- Muffle
- Microorganism tank.

Stationary machines for vermiculture:

- Discharge pump
- Tank pump
- Compost irrigation pump
- Submersible pump
- Loading belt
- Unloading tape
- Cradle motors
- Hot water tank
- Trimer

Swimming pools:

- 25 hp pump
- 50 hp pump
- 7 hp pump
- Sewage pump
- Pressurizing pump
- Submersible pump

The useful life of fixed equipment is 15 years and mobile equipment is 10 years.

The processes and infrastructure are designed for the reception and treatment of waste streams that can be processed by physical and biological means to:

- The recovery of vegetable oils, and fatty acids for sale; from non-hazardous industrial effluents.
- The production of black earth, compost and earthworms (solid and liquid humus) to be marketed as land for filling and soil improvers.

2.4 Project location

Physical address	Geographic coordinates/Other information
Industrial Sector 3 Prof. Nucci St. S/N between Buenos Aires highway and San Martín street, Arroyo Seco, Santa Fe, Argentina	33°08'28.7"S, 60°32'09.3"W

https://www.google.es/maps/place/Complejo+Industrial+de+Tratamiento+y+Valorización+de+NFU%60s/@-33.1420886,-60.5353886,1199m/data=!3m1!1e3!4m5!3m4!1s0x95b7098003704eeb:0xc44239fc4fc4b71b!8m2!3d-33.142272!4d-60.5358492

Figure 4. Picture from the location of WORMS S.A. Source: Google Earth

2.5 Additional information about the GHG Project

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3 Quantification of GHG emissions reduction

3.1 Quantification methodology

3.1.1 Applicability conditions of the methodology

This project activity applied latest CDM Methodology AMS-III.F.: Avoidance of methane through composting, Version 12.

For the validation and verification of projects and program of activities by a designated operating entity (DOE) that uses this methodology, the application of sectoral scope 13 is mandatory.

This methodology is applicable to the composting of the organic fraction of municipal solids and biomass residues from agricultural or agro-industrial activities, including manure.

This methodology includes the construction and expansion of treatment facilities, as well as activities that increase capacity utilization at an existing facility. For project activities that increase capacity utilization at existing facilities, project participants will be required to demonstrate that special efforts are made to increase capacity utilization, that the existing facility complies with all applicable laws and regulations, and that the existing installation is not included in a separate activity of the project. Special efforts must be identified and described.

Applicability	Justification
This methodology comprises measures to avoid the emissions of methane to the atmosphere from biomass or other organic matter that would have otherwise been left to decay anaerobically in a solid waste disposal site (SWDS), or in an animal waste management system (AWMS), or in a wastewater treatment system (WWTS). In the project activity, controlled aerobic treatment by composting of biomass is introduced.	The project involves reducing the emission of methane into the atmosphere from organic matter (from non-hazardous organic waste from biodiesel, oil and cellulose plants, the dairy industry, breweries and agro-industries that produce GHG) that otherwise Otherwise, they would have been left to decompose anaerobically in a solid waste disposal site (SWDS). Controlled aerobic treatment through biomass composting is introduced in the project activity. Therefore, the project meets the applicability conditions.
The project activity does not recover or combust landfill gas from the disposal site (unlike AMS-III.G “Landfill methane	The project activity consists of composting the organic fraction of non-hazardous organic waste from biodiesel, oil and

recovery) and does not undertake controlled combustion of the waste that is not treated biologically in a first step (unlike AMS-III.E "Avoidance of methane production from decay of biomass through controlled combustion, gasification or mechanical/thermal treatment"). Project activities that recover biogas from wastewater treatment shall use the methodology AMS-III.H "Methane recovery in wastewater treatment". Project activities involving co-digestion of organic matters shall apply the methodology AMS-III.AO "Methane recovery through controlled anaerobic digestion".	cellulose plants, the dairy industry, breweries and agro-industries that produce GHG. It does NOT involve any of the below: • Recover or combust landfill gas from disposal site. • Undertake controlled combustion of the waste that is not treated biologically in a first step. • Recover biogas from wastewater treatment. • Co-digestion of organic matters. Hence, the project fulfils the applicability conditions.
Measures are limited to those that result in emission reductions of less than or equal to 60 kt CO_2 equivalent annually.	The annual average emission reduction is 12,329.86 ton CO_2e/year, on average, which is less than 60 kt CO_2 equivalent annually. Hence, the project fulfils the applicability conditions.
This methodology is applicable to the composting of the organic fraction of municipal solid waste and biomass waste from agricultural or agro-industrial activities including manure.	The project activity consists of composting the organic fraction of the solid waste from cereal plants into compost. Therefore, the project meets the applicability condition.
This methodology includes construction and expansion of treatment facilities as well as activities that increase capacity utilization at an existing facility. For project activities that increase capacity utilization at existing facilities, project participant(s) shall demonstrate that special efforts are made to increase the capacity utilization, that the existing facility meets all applicable laws and regulations and that the existing facility is not included in a separate project activity.	The condition is not applicable for this project.

This methodology is also applicable for co-composting wastewater and solid biomass waste, where wastewater would otherwise have been treated in an anaerobic wastewater treatment system without biogas recovery. The wastewater in the project scenario is used as a source of moisture and/or nutrients to the biological treatment process e.g. composting of empty fruit bunches (EFB), a residue from palm oil production, with the addition of palm oil mill effluent (POME) which is the wastewater co-produced from palm oil production.	The condition is not applicable for this project as the project does not involve co-composting.
In case of co-composting, if it cannot be demonstrated that the organic matter would otherwise been left to decay anaerobically, baseline emissions related to such organic matter shall be accounted for as zero, whereas project emissions shall be calculated according to the procedures presented in this methodology for all co-composted substrates.	Not applicable.
The location and characteristics of the disposal site of the biomass, animal manure and co-composting wastewater in the baseline condition shall be known, in such a way as to allow the estimation of its methane emissions, using the provisions of AMS-III.G, AMS III.E (concerning stockpile), AMS-III.D "Methane recovery in animal manure management systems" or AMS-III.H respectively.	The project involves the composting of the organic fraction of solid waste from grain industries, which would otherwise have been disposed of in landfills. The project does not involve the composting of biomass, animal manure or co-composting. Therefore, this condition does not apply to this project.
Blending materials may be added in the project scenario to increase the efficiency of the composting process (e.g. to achieve a desirable C/N ratio or free air space value), however, only monitored quantity of solid waste or manure or wastewater diverted from the baseline treatment system is used for	For the calculation of the reduction of emissions, only the amount of solid waste from cereal industries that diverted from the reference disposal site, the landfill, is considered. No emission reductions will be claimed for the mixing materials. Therefore, the project meets the applicability condition.

emission reduction calculation. Project activities for composting of animal manure shall also meet the requirements under paragraphs 3 and 4(c) of the latest version of AMS-III.D.	
For solid wastes diverted from a solid waste disposal site, the following requirement shall be checked ex ante at the beginning of each crediting period: (a) Establish that identified landfill(s)/stockpile(s) can be expected to accommodate the waste to be used for the project activity for the duration of the crediting period; or (b) Establish that it is common practice in the region to dispose of the waste in solid waste disposal site (landfill)/stockpile(s).	The landfilling and dumping of waste is the most common waste management method. Hence, the project fulfils the applicability condition.
The project participants shall clearly define the geographical boundary of the region referred in paragraph 11(b), and document it in the PDD. In defining the geographical boundary of the region, project participants should consider the source of the waste i.e. if waste is transported up to 50 km, the region may cover a radius of 50 km around the project activity. In addition, it should also consider the distance to which the final product after composting will be transported. In either case, the region should cover a reasonable radius around the project activity that can be justified with reference to the project circumstances but in no case it shall be more than 200 km. Once defined, the region should not be changed during the crediting period(s).	Previously, the waste was transported from the waste producing plant to the Province of Buenos Aires over a distance of more than 250 km, therefore, since the beginning of the project, this distance and its processing is less than 200 km between the processing plant of the residue and the plants producing it. Therefore conservatively 200 km is considered in the limit of the project. Therefore, the project meets the applicability condition.
In case produced compost is handled aerobically and submitted to soil application, the proper conditions and procedures (not resulting in methane emissions) must be ensured.	Conditions and procedures are set for the compost handling to ensure no methane is emitted during the handling. Hence, the project fulfils the applicability condition.

In case produced compost is treated thermally/mechanically, the provisions in AMS-III.E related to thermal/mechanical treatment shall be applied.	No thermal or mechanical treatment is involved in the post production process. Hence, the project fulfils the applicability condition
In case produced compost is stored under anaerobic conditions and/or delivered to a landfill, emissions from the residual organic content shall to be taken into account and calculated as per the latest version of the methodological tool "Emissions from solid waste disposal sites".	The produced compost is sold to customers as and when it is produced. The compost is not stored under anaerobic condition or delivered to landfill. Hence the condition is not applicable for this project.

Also, the tools applied were:

1. Tool 4. Emissions from solid waste disposal sites. Version 08.1.

Applicability	Justification
The tool can be used to determine emissions for the following types of applications: (a) Application A: The CDM project activity mitigates methane emissions from a specific existing SWDS. Methane emissions are mitigated by capturing and flaring or combusting the methane (e.g. "ACM0001: Flaring or use of landfill gas"). The methane is generated from waste disposed in the past, including prior to the start of the CDM project activity. In these cases, the tool is only applied for an ex ante estimation of emissions in the project design document (CDM-PDD). The emissions will then be monitored during the crediting period using the applicable approaches in the relevant methodologies (e.g. measuring the amount of methane captured from the SWDS); (b) Application B: The CDM project activity avoids or involves the disposal of waste at a SWDS. An example of this application of the tool is ACM0022, in which municipal solid waste (MSW) is treated with an alternative option, such as composting or anaerobic digestion, and is then prevented from being disposed of in a SWDS. The methane is generated from waste disposed or avoided from disposal during the crediting period. In these cases, the tool can be applied for both ex ante and ex post estimation of emissions. These project activities may apply the simplified approach detailed in 0 when calculating baseline emissions.	This project used application B) because the project activity avoids the disposal of waste in a SWDS.

2. Tool 5. "Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation" Version 3.

Applicability	Justification
If emissions are calculated for electricity consumption, the tool is only applicable if one out of the following three scenarios applies to the sources of electricity consumption: (a) Scenario A: Electricity consumption from the grid. The electricity is purchased from the grid only, and either no captive power plant(s) is/are installed at the site of electricity consumption or, if any captive power plant exists on site, it is either not operating or it is not physically able to provide electricity to the electricity consumer; (b) Scenario B: Electricity consumption from (an) off-grid fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants are installed at the site of the electricity consumer and supply the consumer with electricity. The captive power plant(s) is/are not connected to the electricity grid; or (c) Scenario C: Electricity consumption from the grid and (a) fossil fuel fired captive power plant(s). One or more fossil fuel fired captive power plants operate at the site of the electricity consumer. The captive power plant(s) can provide electricity to the electricity consumer. The captive power plant(s) is/are also connected to the electricity grid. Hence, the electricity consumer can be provided with electricity from the captive power plant(s) and the grid.	Since the electricity will be consumed only from grid, the project emission from electricity consumption is estimated as Scenario A.

3. Tool 13. "Project and leakage emissions from composting" Version 2.

Applicability	Justification
CH_4 and N_2O emission from composting	Applicable because of the project involves composting.
CO_2 emissions from consumption of fossil fuels and electricity associated with composting;	Applicable because this tool is applied for the project emissions that involves consumption of fossil fuels and electricity
CH_4 emissions from run-off wastewater associated with co-composting.	Not applicable because there is not co-composting in this project.

4. Tool 3. Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion

Applicability	Justification

This tool provides procedures to calculate project and/or leakage CO_2 emissions from the combustion of fossil fuels. It can be used in cases where CO_2 emissions from fossil fuel combustion are calculated based on the quantity of fuel combusted and its properties. Methodologies using this tool should specify to which combustion process *j* this tool is being applied.	Applicable because of the project involves combustion of fossil fuel.

3.2 Project boundaries

The project boundary is defined as the physical, geographical location of the following:

a) The landfill site, where the solid waste would have been disposed and the methane emission occurs in absence of the proposed project activity;

b) The composting facility, where the treatment of biomass through composting takes place;

c) Consumer places where the compost is handled, disposed, submitted to soil application;

d) And the itineraries between b and c where the transportation of compost occurs. It should be noted that the waste transportation itineraries between a & b are not considered as the project site is located next to the landfill site.

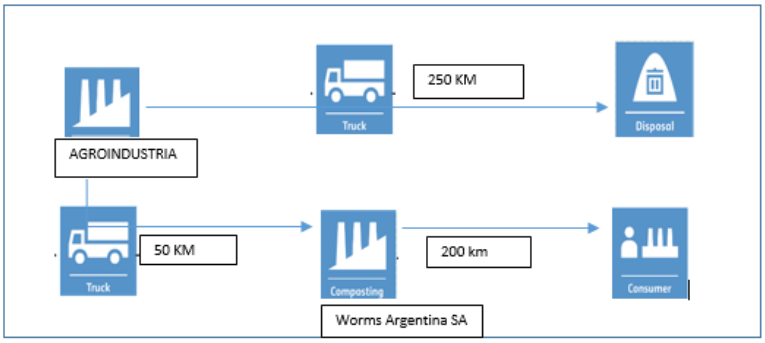

Figure 5. Project Boundary

Previously, waste generators needed to transfer the product (waste) from their generating plant to facilities located in the Province of Buenos Aires (Argentina) to achieve the Final Disposal of non-hazardous organic waste, the closest being at a distance of more than 250 km. Since the beginning of the project, these agro-industrial plants have carried the waste, with the same logistics but with a distance of approximately 50 km, since Worms Argentina S.A is located in the town of Arroyo Seco (Santa Fe) and the generators of these wastes They are located in the region of the industrial belt of Gran Rosario (Rosario - San Lorenzo - Puerto General San Martín - Timbúes). It should be noted that Worms Argentina S.A does not have distribution or

facilities outside the plant for the sale of its product; the product obtained is sold at its plant to final consumers.

INCOME	PRODUCTION	DEPARTURES
*Matter of agroindustries *fuel consumption until reaching the plant (does not correspond to Worms Argentina S.A) *Packing material	*composting and packaging *co-products *waste (it is reused in the composting process) *power consumption *fuel consumption	*Distribution (only makes direct sales) *electricity consumption (included in production)

3.2.1 Spatial limits of the project

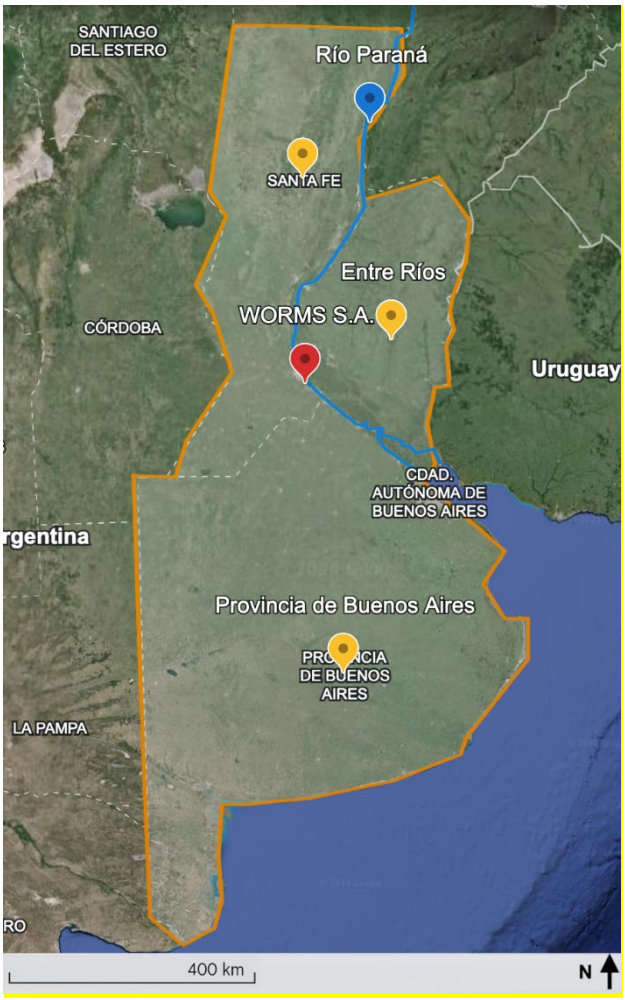

Figure 6. Spatial limits of the project. WORMS S.A. Source: Google Earth.

3.2.2 Carbon reservoirs and GHG sources

Source or reservoir	GHG	Included (Yes/No/Optional)	Justification
Baseline scenario- landfill site	CO_2	No	Not significant.
	CH_4	Yes	Main source of emission
	N_2O	No	Not significant.
Project scenario – Composting site	CO_2	Yes	Emission from diesel consumption and electricity consumption at site
	CH_4	Yes	Significant emission from composting
	N_2O	Yes	Significant emission from composting

3.2.3 Time limits and analysis periods

Project start date:

01/04/2018

Quantification period of the GHG emissions reduction

The crediting period for energy, waste, and other product use projects is 10 years, from 01/04/2018 to 31/03/2028.

Monitoring periods

It is carried out annually for a period of 10 years, from 01/04/2018 to 31/03/2028.

For the first five years (from 01/04/2018 to 31/03/2023), the emissions have been verified because of the validation of amount of solid waste disposed and used by the project holder. Hence, the calculations of the emission reductions in nexts periods are estimations based on the results of the fifth.

3.3 Identification and description of baseline scenario

In the absence of the project activity, organic matter in the municipal solid waste will be dumped and left to decay at the landfill site located within the project boundary and methane is emitted to the atmosphere. Hence the baseline scenario is the continued dumping of the waste on the existing landfill site in the absence of the project activity.

The baseline emissions are the amount of methane emitted from the decay of the degradable organic carbon in the biomass solid waste, without manure or wastewater compost.

3.4 Additionality

As more and more corporations announce commitments to net-zero emissions, there are still few that have set concrete climate goals to make that decarbonization a reality. Effective leadership that allows moving from ambition to real action to face the climate crisis must recognize that transitions are challenging and the path to a sustainable and fair future will not be simple.

This is why the private sector needs to understand the complexities of decarbonizing its operations while investing heavily in actions that support a just transition for all: people and biodiversity. For this reason, as part of an ecological transition process and corporate climate strategies, it is fair to allow the private sector that works to capture or avoid greenhouse gas emissions by selling carbon credits and take an important step thanks to that benefit in improving, with developed technologies, the achievement of the main objective NetZero.

The fate of the compost obtained is used as organic fertilizer for gardens and plantations, thus avoiding the production and emission of GHG and the poor reuse of organic waste that would have been produced by leaving it in a landfill emitting Methane. Worms Argentina S.A operates in the Agro-industrial Pole region of Rosario, Province of Santa Fe (Argentina), which is the area with the largest soybean production and processing in the world, and concentrates a huge generation of organic waste, which is processed only by Worms Argentina S.A in this area.

The processes in Worms Argentina S.A. they are carried out manually by operators specifically trained to prepare the mixture of the residues, previously received and controlled, that are non-hazardous organic based on humidity and temperatures, and then carried out in the land provided for this purpose for the preparation of its fermentation and maturation and the final achievement of the same as COMPOST.

The origin of the waste is given by the large amount of non-hazardous organic waste from biodiesel, oil and cellulose plants, the dairy industry, breweries and agro-industries that produce in the Region to which Worms Argentina S.A. belongs. (Province of Santa Fe and Buenos Aires, Argentina), for which said company is dedicated to specific tasks of environmental sanitation that seek to contribute to the development of a balance between society, the company and the environment, for which it is responsible for investigating and provide viable solutions and sustainable solutions to complex problems such as municipal solid waste, non-hazardous liquid and solid organic waste, as well as end-of-life tires.

Previously, the aforementioned companies carried out the transfer of these aforementioned wastes to outsourced companies for their final disposal, which were

treated artificially based on the established standards and subsequent incineration or disposal in landfills, producing significant GHG emissions in their measures.

To process all the waste generated in the area, Worms Argentina S.A needs to continue to invest in increasing its processing capacity.

The applicable requirements specified in the "General Guidelines for SSC CDM methodologies" (for example, calibration requirements and sampling requirements) are also an integral part of the monitoring guidelines specified below and, therefore, will be referred to by the project participants.

Additionality determination of the project activity follows the methodological tool "Tool for the demonstration and assessment of additionality, version 07.0.0" it has also been taken into account the methodological tool "Assessment of the validity of the original/current baseline and update of the baseline at the renewal of the crediting period, version 03.0.1".

The basic structure of the process is detailed according to the sequence specified by the methodology:

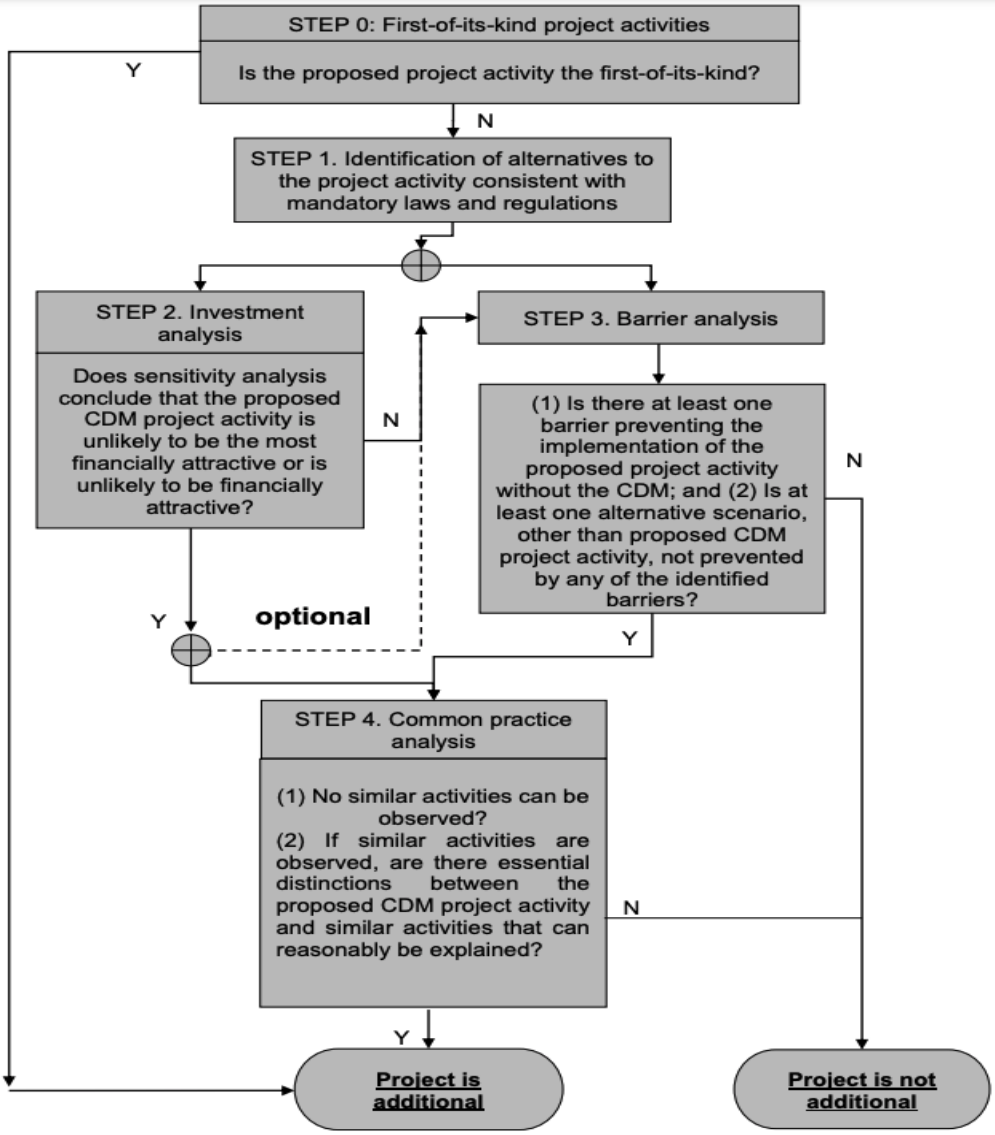

Figure 7. Basic structure of the process is detailed according to the sequence specified by the methodology

Step 0:

To determinate whether or not the project is the first of its kind the tool used has been the Methodological tool 23, Additionality of first-of-its-kind project activities Version 03.0.

The applicable geographical area selected for the project is the one determined by the provinces of Santa Fe, Entre Ríos and Buenos Aires. The reason why the area is limited to this three instead of the entire country is that the most relevant element is the river Paraná. This river concentrates the fluvial ports that constitute the main suppliers for Worms and also heavily influence the concentration of agro-industrial companies where

the wastes are produced. The origin and composition of the wastes employed in the project force the situation of the installations to the point that outside this area the cost of transport and logistic difficulties will make it extremely hard to succeed.

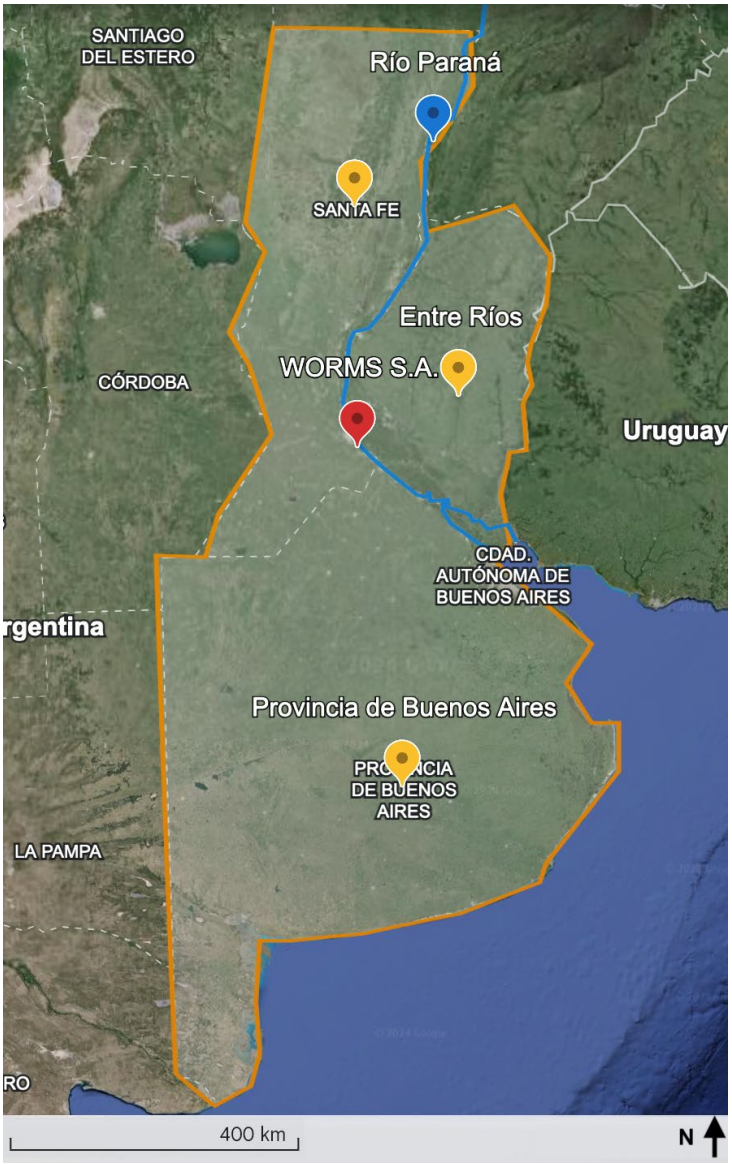

Figure 7. Spatial limits of the project. WORMS S.A. Source: Google Earth.

The high dependency of the project and project activity of the fluvial ports makes necessary to include all the provinces that the Paraná river crosses to compile with all the regulations and administrative management at regional level.

Among the measures implemented in Worms, the one that established a clear distinction with the rest of composting companies in the area is the use of vermiculture and origin of the organic waste. This measure has a doble impact:

- Feedstock switch: the residues are originated mostly form agro-industrial companies while the majority of the other composting companies use domestic residues.
- Energy efficient technology: the use of vermiculture voids the need of mechanical flipped of compost piles, reducing the use of machinery and therefore, the use of fossil fuels or electricity.

The output generated is compost of the highest quality thanks to the advantages of vermiculture which increase the concentration of nutrients for plants.

Vermiculture is a different technology only used by Worms in the geographical are that deliver the same output than the following companies identified:

- Biofertyl: located in La Vidalita & Facundo Quiroga B1781 Marcos Paz, Provincia de Buenos Aires, Argentina, they used a different composting process and organic waste for the generation of compost.
- Symeco: located in Ocampo 4161, Rosario, Provincia de Santa Fe, Argentina, they treat different kinds of waste but they don´t have permission to work with organic residues, therefore they can´t generated compost.
- HiSoils: located in Pilar 1629, Buenos Aires, Arfentina, they used primarily wastes originated in domestic environment and with cattle feedstock and manure.

The methodology procedure establishes that a proposed project activity is the first of its kind in the applicable geographical area if is the first in the applicable geographical area that applies a technology that is different from technologies that are implemented by any other project, which are able to deliver the same output and have started commercial operation in the applicable geographical area before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of the proposed project activity, whichever is earlier; The project implements one or more of the measures and the project participants selected a crediting period for the project activity that is “a maximum of 10 years with no option of renewal”.

In this case Worms is the only one using vermiculture as a different technology delivering the same output (compost) in the applicable geographical area and has started commercial operation before the PDD is published. It also implements two measures and the project participants selected a crediting period of 10 years with no renewal.

All things considered this project is a first-of-its-kind and therefore the project is additional.

3.5 Management of Uncertainty

For the calculation of the uncertainty, the uncertainty of the data has been considered since it does not influence:

- Combination of uncertainty of emission factors and activity data: Low.
- Emission factors: Official and specific sources for each category.
- Real and accurate activity data: Direct collection of reports and invoices from service providers.

IMPACT FACTOR	
VALUE	IMPACT FACTOR
1	Specific factors (official and verified sources)
2	General factors (unofficial and verified sources)
3	Estimated factors (unofficial)

VALUE	ACTIVITY
1	Detailed activity data
2	Data modeled using assumptions
3	Uncertainly data

RANGE	UNCERTAINLY
9	HIGH
3 to 6	MEDIUM
1 to 3	LOW

UNCERTAINLY CALCULATION						
Emission source	Source of emission or collection of data	Quality data	Impact factor	Activity data	Total uncertainly	
Electricity	Supplier Invoices - Direct Collection.	https://www.climate-transparency.org/wp-content/uploads/2022/10/CT2022-Argentina-Web.pdf#page=6%20_blank, page 9	1	1	1	LOW
Fuels-mobile sources	Supplier Invoices - Direct Collection.	Emisiones de CO2 calculadas a partir de las ventas al público de combustibles líquidos en EESS - año 2018	1	1	1	LOW

Emission of GHG in the process	Calculation and official methodology	https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_Chapter08_FINAL.pdf . page 731	1	2	2	LOW
Amount of solid waste	Income control trucks and weighted of accepted cargos	Direct measurements realized by Worms Argentina S.L within its installations.	1	1	1	LOW

3.6 Leakage and non-permanence

Based on methodology AMS.III.F, there is no leakage emission from this project activity because:

- No composting technology equipment is transferred from or to another activity.
- The compost is not stored in anaerobic condition and not disposed of in a SWDS.

The permanence of the project is ensured because this project is retroactive and the emission reduction is calculated after its commissioning.

So, $LE_y = 0$.

3.7 Mitigation results

The project is a retroactive project, and the emission reduction is calculated after the commissioning of the project. The results shown in the table are the consequence of the application of the methodology AMS-III.F for composting non-hazardous solid waste.

All the activities described are the result of the construction of new composting facilities or the expansion of capacity of existing composting facilities within the period contemplated. Therefore, the formula used as indicated in the methodology AMS-III.F. Small-scale methodology: Avoidance of methane emissions through composting Version 12.0, is the Equation 2:

$$ERy = BEy + (PEy - LEy)$$

Where:

ERy = Emission reduction in the year y (tCO_2e)
BEy = Baseline emissions in year y (tCO_2e)
PEy = Project emissions in the year y (tCO_2e)
LEy = Leakage emissions in year y (tCO_2e)

PERIOD	BASELINE EMISSIONS	PROJECT EMISSIONS	LEAKAGE EMISIONS	EMISSION REDUCTION

1/april/2018-31/march/2019	10,873.35	1350.29	-	9,523.06
1/april/2019-31/march/2020	14,911.21	1,860.37	-	13,050.84
1/april/2020-31/march/2021	12,540.35	1,568.11	-	10,972.24
1/april/2021-31/march/2022	15,164.45	1,890.68	-	13,273.77
1/april/2022-31/march/2023	14,606.30	1,860.24	-	12,746.06
1/april/2023-31/march/2024	14,606.30	1,859.77	-	12,746.53
1/april/2024-31/march/2025	14,606.30	1,859.77	-	12,746.53
1/april/2025-31/march/2026	14,606.30	1,859.77	-	12,746.53
1/april/2026-31/march/2027	14,606.30	1,859.77	-	12,746.53
1/april/2027-31/march/2028	14,606.30	1,859.77	-	12,746.53
TOTAL (tCO_2e)	**141,127.18**	**17,828.55**		**123,298.63**

3.7.1 Eligible areas in the GHG project boundary (if applicable)

-0-

3.7.2 Stratification (if applicable)

-0-

3.7.3 GHG emission reductions in the baseline scenario

As per para 24 of the applied methodology (AMS III.F.), baseline emissions shall exclude emissions of methane that would have to be captured, fuelled or flared to comply with national or local safety requirements or legal regulations.

$$BE_y = BE_{CH4,SWDS,y} + BE_{ww,y} + BE_{CH4,manure,y} - MD_{y,reg} \times GWP_{CH4}$$

Where:

BE_y = *Baseline emissions in the year y (tCO_2e)*

$BE_{CH4,SWDS,y}$	=	*Yearly methane generation potential of the solid waste composted by the project activity during the years x from the beginning of the project activity (x=1) up to the year y estimated as per the latest version of the methodological tool "Emissions from solid waste disposal sites" (tCO_2e). The tool may be used with the factor "f=0.1" taking into account the methane oxidation effect by the upper layer of the landfill. With the definition of year x as 'the year since the project activity started diverting wastes from landfill disposal, x runs from the first year of crediting period (x=1) to the year for which emissions are calculated (x=y)'*
$MD_{y,reg}$	=	*Amount of methane that would have to be captured and combusted in the year y to comply with the prevailing regulations (tone)*
$BE_{CH4,manure,y}$	=	*Where applicable, baseline emissions from manure composted by the project activities, as per the procedures in AMS-III.D (tCO_2e)*
$BE_{ww,y}$	=	*Where applicable, baseline emissions from the wastewater co-composted, calculated as per the procedures in AMS-III.H (tCO_2e)*
GWP_{CH4}	=	*Global Warming Potential for CH_4 applicable to the crediting period (t CO_2e/t CH_4)*

The project does not involve co-composting along with waste water. Hence, the project does not involve composting of manure. Also, the existing landfill does not contain a methane recovery system: in order to comply with the prevailing regulations, it's not required to capture or combust methane for the project activity. So, final equation applied is:

$$BEy = BE_{CH4,SWDS,y}$$

Yearly methane generation potential from solid waste disposal site ($BE_{CH4,SWDS,y}$)

The Yearly Methane Generation Potential for the solid waste ($BE_{CH4,SWDS,y}$) is calculated using the first order decay model as described in the latest version of the methodological tool "Emissions from solid waste disposal sites" (version 08.1).

Since the methane generation from municipal solid waste is treated with composting technology, the tool is applicable for the project under 'Applicability B' of the project activity. As per para 17, the baseline methane emission from solid waste disposal site will be calculated as below:

$$BE_{CH4,SWDS,y} = \varphi_y * (1 - f_y) * GWP_{CH4} * (1 - OX) * \frac{16}{12} * F * DOC_{f,y} * MCF_y$$
$$* \sum_{x=1}^{y} \sum_{y} (W_{j,x} * DOC_j * e^{-kj*(y-x)} * (1 - e^{-kj})$$

Where:

$BE_{CH4,SWDS,y}$ = Baseline methane emissions occurring in year y generated from waste disposal at a SWDS during a time period ending in year y (t CO_2e/yr)

x = Years in the time period in which waste is disposed at the SWDS, extending from the first year in the time period (x = 1) to year y (x = y)

y = Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)

$DOC_{f,y}$ = Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)

$W_{j,x}$ = Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)

φ_y = Model correction factor to account for model uncertainties for year y.

f_y = Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y

GWP_{CH4} = Global Warming Potential of methane

OX = Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)

F = Fraction of methane in the SWDS gas (volume fraction)

MCF_y = Methane correction factor for year y

DOC_j = Fraction of degradable organic carbon in the waste type j (weight fraction)

k = Decay rate for the waste type j (1 / yr)

j = Type of residual waste or types of waste in the MSW

Model correction factor to account for model uncertainties for year y (φ_y)

The default value is applied for application B and in humid/wet conditions, so **φ_y = 0,85.**

Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y (fy)

For application B the monitoring annually: Select the maximum value from the following: (a) contract or regulation requirements specifying the amount of methane that must be destroyed/used (if available) and (b) historic data on the amount captured.

fy = 0 (assumed)

Global Warming Potential of methane (GWP_{CH4})

This parameter is established by IPCC for each years.

GWP_{CH4} **= 28 tCO_2e / t CH_4**

Oxidation factor (OX)

For applications A and B, the default value of OX is 0,1.

OX = 0,1

Fraction of methane in the SWDS gas (volume fraction) (F)

For applications A and B, the default value of F is 0,5.

F = 0,5

Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction) ($DOC_{f,y}$)

For application B, and table 14 (page 14) in the case of MSW, default value is established by IPCC Guidelines for National GGI. So, $DOC_{f,y}$ **= 0,5**

Methane correction factor for year y (MCF_y)

For application B, considering SWDS without a water table above the bottom of the SWDS, the default values (based on SWDS type) for MCFy is 1, as per table 5, for anaerobic managed solid waste disposal sites.

MCF_y = 1

Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t) ($W_{j,x}$)

PERIOD / YEAR	1 1/april/2018-31/march/2019	2 1/april/2019-31/march/2020	3 1/april/2020-31/march/2021	4 1/april/2021-31/march/2022	5 1/april/2022-31/march/2023	TOTAL (t)
W,y (t)	12,292.56	16,857.45	14,177.14	17,143.75	16,512.75	76,983.65

For the estimation period since 1/april/2023 to 31/march/2028, the value for $W_{,y}$ is the same as for period number 5 (1/april/2022-31/march/2023), 16,512.75 tons per year.

Fraction of degradable organic carbon in the waste type j (weight fraction) (DOC_j)

For application B, and table 6, the value for MSW and food, food waste, beverages and tobacco (other than sludge) is 15% wet waste.

DOC_j = 15%

Decay rate for the waste type j (1/yr) (k_j)

For rapidly degrading waste (food, food waste, beverages and tobacco) and boreal and temperate (MAT ≤ 20ºC), Wet (MAP/p ET > 1), the value is 0,185 1/yr. **k_j = 0,185 1/yr.**

So, the results of the baseline for each year are:

PERIOD/YEAR	BASELINE (t CO_2 e)
1	10,873.35

1/april/2018-31/march/2019	
2 1/april/2019-31/march/2020	14,911.21
3 1/april/2020-31/march/2021	12,540.35
4 1/april/2021-31/march/2022	15,164.45
5 1/april/2022-31/march/2023	14,606.30
6 1/april/2023-31/march/2024	14,606.30
7 1/april/2024-31/march/2025	14,606.30
8 1/april/2025-31/march/2026	14,606.30
9 1/april/2026-31/march/2027	14,606.30
10 1/april/2027-31/march/2028	14,606.30
TOTAL (t CO_2 e)	141,127.18

3.7.4 GHG emission reductions in the project- scenario

Project emissions from composting process (PE_y) will be determined as per the methodological tool "Project and leakage emissions from composting", version 2. As per the tool the project emission from composting is calculated as below:

$$PE_y = PE_{COMP,y} = PE_{EC,y} + PE_{FC,y} + PE_{CH4,y} + PE_{N2O,y} + PE_{RO,y}$$

Where:

$PE_{COMP,y}$ = Project emissions associated with composting in year y (t CO_2e/yr)

$PE_{EC,y}$ = Project emissions from electricity consumption associated with composting in year y (t CO_2/yr)

$PE_{FC,y}$ = Project emissions from fossil fuel consumption associated with composting in year y (t CO_2/yr)

$PE_{CH4,y}$ = Project emissions of methane from the composting process in year y (t CO_2e/yr)

$PE_{N2O,y}$ = Project emissions of nitrous oxide from the composting process in year y (t CO_2e/yr)

$PE_{RO,y}$ = Project emissions of methane from run-off wastewater associated with co-composting in year y (t CO_2e/yr)

The project does not involve co-composting. Hence, $PE_{RO,y}$=0

Hence the project emission equation is reduced as below:

$$PE_y = PE_{EC,y} + PE_{FC,y} + PE_{CH4,y} + PE_{N20,y}$$

Determination of project emissions from electricity consumption ($PE_{EC,y}$)

Since the electricity will be consumed only from grid, the project emission from electricity consumption is estimated as per the methodological tool 05 '[Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation]', version 3, as per para 16 of the tool the project emission from electricity consumption. It's calculated as below:

$$PE_{EC,y} = \sum_j EC_{PJ,j,y} * EF_{EL,j,y} * (1 + TDL_{j,y})$$

Where,

$PE_{EC,y}$ = Project emissions from electricity consumption in year y (t CO_2 / yr)

$EC_{PJ,j,y}$ = Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)

$EF_{EL,j,y}$ = Emission factor for electricity generation for source j in year y (t CO_2/MWh)

$TDL_{j,y}$ = Average technical transmission and distribution losses for providing electricity to source j in year y

Quantity of electricity consumed by the project electricity consumption source j in year y (MWh/yr)

PERIOD / YEAR	1	2	3	4	5

	1/april/2018-31/march/2019	1/april/2019-31/march/2020	1/april/2020-31/march/2021	1/april/2021-31/march/2022	1/april/2022-31/march/2023
$EC_{PJ,j,y}$ (MWh)	16.75	19.50	21.25	22.50	20.00

For the estimation period since 1/april/2023 to 31/march/2028, the value for $EF_{EF,,j,y}$ is the same as for period 5, 20.00 MWh per year.

Emission factor for electricity generation for source j in year y (t CO_2/MWh)

Based on the information from the Argentine Government: https://www.argentina.gob.ar/economia/energia/energia-electrica/estadisticas ;https://cammesaweb.cammesa.com/download/factor-de-emision/., the emission factor is an average of each years for the period.

	2018	2019	2020	2021	2022	2023
$EF_{,EF,j,y}$ (t CO_2 e /MWh)	0,296	0,267	0,275	0,292	0,2717	0,231

So,

PERIOD / YEAR	1 1/april/2018-31/march/2019	2 1/april/2019-31/march/2020	3 1/april/2020-31/march/2021	4 1/april/2021-31/march/2022	5 1/april/2022-31/march/2023
$EF_{,EF,j,y}$ (t CO_2 e /MWh)	0,2815	0,271	0,2835	0,28185	0,25135

For the estimation period since 1/april/2023 to 31/march/2028, the value for $EF_{EF,,j,y}$ is the same as for year 2023, 0,231 (t CO_2 e /MWh) per year.

Average technical transmission and distribution losses for providing electricity to source j in year y (TDL).

Based on The Wolrd Bank stadistics (IEA), the electric power transmission and distribution losses (% of outputs) in Argentina is 15%. So, **$TDL_{j,y}$ = 15%**

So, the results of the project emission from electricity consumption are:

PERIOD / YEAR	1 1/april/2018- 31/march/2019	2 1/april/2019- 31/march/2020	3 1/april/2020- 31/march/2021	4 1/april/2021- 31/march/2022	5 1/april/2022- 31/march/2023	6-10 1/april/2023- 31/march/2028 (yearly)
$PE_{EC,y}$ (t CO_2e)	5.42	6.08	6.93	7.29	5.78	5.31

Determination of project emissions from fossil fuel consumption ($PE_{FC,y}$)

Project emissions from fossil fuel consumption ($PE_{FC,y}$), since the only fuel in the project activity is diesel, is calculated as below:

$$PE_{FC,j,y} = FC_y \times EF_{FC,default}$$

Where:

$PE_{FC,j,y}$ = CO_2 emissions from fossil fuel combustion in process j during the year y (tCO_2/yr)

FC_y = Quantity of diesel combusted in process j during the year y (L/yr)

$EF_{FC,default}$ = Emission factor of diesel in year y (tCO_2/L)

The value of the emission factor of diesel for every year is based on the information from the Argentine Government:

https://www.energia.gob.ar/contenidos/archivos/Reorganizacion/informacion_del_mercado/mercado_hidrocarburos/mapas/metodologia_huella_CO2_eess.pdf

The results of this equation are collected in the following table:

PERIOD / YEAR	1 1/april/2018 - 31/march/2019	2 1/april/2019 - 31/march/2020	3 1/april/2020 - 31/march/2021	4 1/april/2021 - 31/march/2022	5 1/april/2022 - 31/march/2023
FC (L)	12,174.80	20,528.73	17,923.14	19,959.50	34,699.79

EF (ton CO_{2e}/L)	0,00261	0,00261	0,00261	0,00261	0,00261
$PE_{FC,y}$	**31.78**	**53.58**	**46,78**	**52.09**	**90.57**

For the estimation period 6-10, the results of $PE_{FC,y}$ are the same as for period 5 per year (90.57 ton CO_2e)

Determination of project emissions of methane ($PE_{CH4,y}$)

As per para 22 of the tool, Project emissions of methane from composting are determined as follows:

$$PE_{CH4,y} = Q_y \times EF_{CH4,y} \times GWP_{CH4}$$

Where:

$PE_{CH4,y}$ = Project emissions of methane from the composting process in year y (t CO_2e / yr)

Q_y = Quantity of waste composted in year y (t / yr)

$EF_{CH4,y}$ = Emission factor of methane per tonne of waste composted valid for year y (t CH_4 / t)

GWP_{CH4} = Global Warming Potential of CH_4 (t CO_2e / t CH_4)

As per option 2, the default value is used for emission factor of methane per tonne of waste; $EF_{CH4,} = EF_{CH4,efault}$ = 0,002 (t CO_2 e /t CH_4)

Hence, the emissions of methane are as following:

PERIOD / YEAR	1 1/april/2018 - 31/march/2019	2 1/april/2019 - 31/march/2020	3 1/april/2020 - 31/march/2021	4 1/april/2021 - 31/march/2022	5 1/april/2022 - 31/march/2023
$PE_{CH4,y}$	674.62	925.14	778.04	940.85	906.22

For the estimation period 6-10, the results of $PE_{CH4,y}$ are the same as for period 5 per year.

Determination of project emissions of nitrous oxide ($PE_{N2O,y}$)

As per para 26 of the tool, project emissions of nitrous oxide from composting are determined as follows:

$$PE_{N20,y} = Q_y \times EF_{N20,y} \times GWP_{N20}$$

Where:

$PE_{N2O,y}$ = Project emissions of N_2O from the composting process in year y (t CO_2e/yr)

Q_y = Quantity of waste composted in year y (t /yr)

$EF_{N2O,y}$ = Emission factor of N_2O per tonne of waste composted valid for year y (t N_2O/t)

GWP_{N2O} = Global Warming Potential of N_2O (t CO_2e / t N_2O)

As per option 2, the default value is used for emission factor of N_2O per tonne of waste, ie, $EF_{N2O,} = EF_{N2O,default}$ = 0,0002 (t CO_2 e /t N_2O)

Hence, the emissions of nitrous oxide are as following:

PERIOD / YEAR	1 1/april/2018 - 31/march/2019	2 1/april/2019 - 31/march/2020	3 1/april/2020 - 31/march/2021	4 1/april/2021 - 31/march/2022	5 1/april/2022 - 31/march/2023
$PE_{N2O,y}$ (t CO_2 e)	638.48	875.58	736.36	890.45	857.67

For the estimation periods 6-10, the results of $PE_{N2O,y}$ are the same as for period 5 per year.

In conclusion, the results of the project emissions are as following:

PERIOD / YEAR	1 1/april/2018-31/march/2019	2 1/april/2019-31/march/2020	3 1/april/2020-31/march/2021	4 1/april/2021-31/march/2022	5 1/april/2022-31/march/2023	6-10 1/april/2023-31/march/2028 (yearly)
$PE_{EC,y}$	5.42	6.08	6.93	7.29	5.78	5.31
$PE_{FC,y}$	31.78	53.58	46,78	52.09	90.57	90.57
$PE_{CH4,y}$	674.62	925.14	778.04	940.85	906.22	906.22
$PE_{N2O,y}$	638.48	875.58	736.36	890.45	857.67	857.67
TOTAL (t CO_2 e)	**1,350.29**	**1,860.37**	**1,568.11**	**1,890.68**	**1,860.24**	**1,859.77**

Emission reduction

All the activities described are the result of the construction of new composting facilities or the expansion of capacity of existing composting facilities within the period contemplated. Therefore, the formula used as indicated in the methodology AMS-III.F. Small-scale methodology: Avoidance of methane emissions through composting Version 12.0, is the Equation 2:

$$ERy = BEy + (PEy - LEy)$$

Where:

ERy	=	*Emission reduction in the year y (tCO_2e)*
BEy	=	*Baseline emissions in year y (tCO_2e)*
PEy	=	*Project emissions in the year y (tCO_2e)*
LEy	=	*Leakage emissions in year y (tCO_2e)*

PERIOD	BASELINE EMISSIONS	PROJECT EMISSIONS	LEAKAGE EMISIONS	EMISSION REDUCTION
1/april/2018-31/march/2019	10,873.35	1350.29	-	9,523.06
1/april/2019-31/march/2020	14,911.21	1,860.37	-	13,050.84
1/april/2020-31/march/2021	12,540.35	1,568.11	-	10,972.24
1/april/2021-31/march/2022	15,164.45	1,890.68	-	13,273.77
1/april/2022-31/march/2023	14,606.30	1,860.24	-	12,746.06
1/april/2023-31/march/2024	14,606.30	1,859.77	-	12,746.53
1/april/2024-31/march/2025	14,606.30	1,859.77	-	12,746.53
1/april/2025-31/march/2026	14,606.30	1,859.77	-	12,746.53
1/april/2026-31/march/2027	14,606.30	1,859.77	-	12,746.53
1/april/2027-31/march/2028	14,606.30	1,859.77	-	12,746.53
TOTAL (t CO_2 e)	141,127.18	17,828.55		123,298.63

4 Compliance with applicable legislation

Worms Argentina S.A. complies with all the regulations required at local, regional and national level, in addition to having updated all the necessary permits, as shown by the following links to the documents.

- 7-Otorgamiento uso conforme de suelo A. Seco 29-06-2017
- 34-Habilitación Munic. Planta A. Seco - Resol.Nº 024-18 - 16.03.2018
- 27-Resol. Nº 523 WORMS ARG. S.A. EIA
- 55-Disp. 287-19 Renov. Reg. RT 0029
- Permiso vuelco de efluentes 21-06-19 WORMS
- 2-WORMS Renovacion directorio 2021

The project location corresponds with an area where there are not indigenous communities or traditional territories according to the Indigenous Affairs Institute INAI ("Instituto Nacional de Asuntos Indígenas", in spanish), the governmental body of Argentina that regulates and controlled issues related with traditional an ingenuous communities with in the country. The following map provides information of the Territories with actual Occupation, Traditional and Public according to the law 26.160 that clearly specifies that there are not indigenous territories near the project location or spatial limit.

Figure 8. Map of territories with current, traditional and public occupation (Law 26,160) of the Indigenous Affairs Institute. (Source; INAI "Instituto Nacional de Asuntos Indígenas".

5 Carbon ownership and rights

5.1 Project holder

Individual or organization	**WORMS ARGENTINA S.A.**
Contact person:	ANDRES BELTRAMO
Job position	HEAD OF OPERATIONS DEPARTMENT
Address	*Prof. Nucci S/N , Arroyo Seco, Santa Fe*
Phone number	*+54 9 3402 417968*
Email	*abeltramo@worms.ar*

5.2 Other project participants

-0-

5.3 Agreements related to carbon rights

Worms Argentina S.A 100%

5.4 Land tenure (if applicable)

-0-

6 Climate change adaptation

According to BCR Standard and BCR Tool No Net Harm Enviromental and Social Safeguards (NNH), Worms Argentina S.A. has many actions to reduce and to demonstrate our contribution to mitigating Greenhouse Gases.

In addition to complying with all environmental regulations, as indicated in the legislation section, WORMS S.A. addresses aspects framed in Argentina's regulations, its national policies and its strategic plans. Worms Argentina S.A. is aligned with the National Plan of Adaptation and Mitigation to Climate Change 2030 in Argentina (2022). Specifically, the strategic line “Productive Transition” aims to integrate the macroeconomic, social and environmental component, implementing policies and improvements in the competitiveness of national productive development, which promote the reduction of GHG emissions and the increase in the resilience of the national productive system.

Some policies for the promotion of energy efficiency and efficiency and rational use of resources in Argentina's national plan are:

- Development of national value chains
- Sustainable design and process innovation
- Circular economy
- Productive resilience

Worms S.A. is an example of circular economy and innovation because of our innovative process of waste treatment, which not only reduces the problem of the waste generation and degradation, with its consecutive contamination and incrementation of GreenHouse Gases, but also recovers waste, transforming it into raw material and a circular resource.

In Worms S.A. the respect for the environment and the responsible use of resources are essential factors when defining our business and the way we do it.

Therefore, we implement different practices and policies aligned to preserve and care for the resources and the environment where we operate. Our raw material is 98% industrial waste. We provide a comprehensive solution to the problem of final deposition of liquid and solid industrial waste from the country's large generators, which over the years, in the absence of government regulations and lack of responsibility on the part of these industries, have led to the contamination of rivers, lakes and seas; to the expansion of open-air dumps, clandestine dumps, decompositions, harming the population and living beings of other species: fish and plants.

WORMS Argentina is also committed to the efficient use and reuse of energy: it has a rainwater collection system for the production of liquid humus, it does not use potable water and it does not have a potable water installation use bottled water from returnable containers for human water consumption. In fact, the efficiency of the electric system allows to reduce our impact and our emissions of GHG.

As part of the climate change adaptation policies and compromises of the company, Worms Argentina S.A. has increased its production with the implementation of new installations that allows for liquid waste treatment. The process design and implementation does not require additional energy or fuel consumption, which means that the production and waste treatment capabilities of the company has increased exponentially without an increase in GHG emissions as a result of the project activity.

In Worms Argentina S.A. the protection and conservation of the ecosystem services are an important part of our propose. We are committed to the challenge of being able to guarantee the human well-being of the team and the people who live in relation to the company, combining our business with the generation of positive social and environmental contributions.

All of these prupose and activities are endorsed by the BCorp certification. This purpose is compilated in the Environmental Manual, the Resource Conservation Manual and the

Environmental Management System, which are included in the certification of B Corp Company.

The Environmental Manual establishes our commitments with the respect and responsible uses of the sources in all of our company: environment (ecosystems, water, soil and air), offices (waste separation and recycling, energy efficiency and water care).

The objective of the Environmental Management System is the control of selected indicators in order to monitor and determine the degree of impact produced on the environment from the activities of all the business units operating in Worms S.A.

7 Risk management

With the aim of coordinating the actions to prevent potential emergencies, Worms Argentina S.A. has implemented a contingency plan that includes different risks and actions:

Environmental Risk:

Identification of the potential natural and anthropogenic risks that GHG mitigation actions may face and determine the measures necessary to mitigate such risks.

Risk	**Measures**
NATURAL PHENOMENA - Flood	- Road and water reservoir maintenance. - Suspension of operations in case of risk of flooding.
NATURAL PHENOMENA - thunderstorm	- Lightning rod installation.
Extern agents and staff risk.	- 24 hours security with perimeter fencing, cameras and access control.
Risk of fire (forest or grass, waste piles or organic waste composting process).	Emergency Response Plan. Alarm and start of preventive protocol to avoid damage to combustible materials in storage.
Personal risk or transportation incident	- Demarcation, signaling and maintenance of internal streets and access. - Accident prevention and first aid courses.

Financial Risk

Identified potential financial risks related to expected costs and investments, as well as project cash flows and defined measures to mitigate financial risks.

Risk	**Measures**
Increase in cost and expenses	Diversified activities in order to developed 3 activities simultaneously with in the company allowing to redirect profits from one of them in other if necessary.
Low cash flow	Continuation of the expansion plan to increase the number of suppliers and clients increasing the business volume and cash flow.

Social Risk

Determined medium- and short-term risks associated with the participation of local communities and stakeholders in the activities proposed.

Risk	**Measures**
Change in governmental priorities	- Establish measures to ensure the project´s independency from governmental help and self-operating capacity. - Closed work with local governments to collaborate in local policies.
Problems in communication with the stakeholders	- Implementation of the communication and consultation plan to aligned the different stakeholders' priorities.

Leakage and non-permanence

In order to keep possible leakages under control, the following criteria will be maintained as it has been applied to date.

- Using bio-oils whose origin is from industrial waste not conditioning or affecting in any way the agricultural waste-based bio-oil production elsewhere.

- Avoiding the increased use of fossil fuel due to the replacement of biomass fuel with fossil by using agricultural industrial waste without commercial value being the alternative treatment it´s deposition in to the sewers or landfills.

- Preventing the leakage from the anaerobic breakdown of the bio-oil, produced in the project activity as the methodology establishes that if invoices are provided proving the sale of the bio-oil, this leakage can be omitted and the commercial sale of the bio-oil is and all the recovered fatty acids is the main goal of the installation.

The data control required to monitor and control the GHG reduction process are the same that are required to verify the correct functioning of the company, therefore, the mechanisms of monitorization and control applied for both criteria.

The information will be collected and controlled for the VCC that will be conducted every three years maximum during the duration of the project.

7.1 Reversal risk management

This is a case of an ex-post project, which means that the current activity has been operating for four years already. All the project participants and stakeholders are already committed and with contracts in place. The possible difficulties could be of financial and social nature and have already been considered in the risk management plan.

The best proof of the commitment of the stakeholders involved is the trajectory and expansion of the project in the previous years and plans for its expansion and growth contemplated in this document.

8 Environmental Aspects

Worms Argentina S.A. executes a series of control programs in order to comply with regulations and maintain the best practices available in its management and quality system. The main programs are described below and reports condensing soil, water and air monitoring are attached.

SOIL RESOURCE PROTECTION PROGRAM

Hazardous Waste Management Subprogram:

This Subprogram is based on the segregation of hazardous waste streams at their generation points. The operating personnel will be trained and made aware of the areas where the generation of hazardous waste is foreseeable.

In the eventual case of receiving improper or rejects with dangerous characteristics, they will be stored in compliance with current regulations, and subsequent referral to an authorized operator according to the current in question.

Drainage and Flooding Control Subprogram:

The construction works of the internal circulation roads and transport parking areas were carried out respecting the natural drainage conditions of the land, avoiding the generation of flooding inside the property.

Likewise, the maintenance of the internal protection channels and the external pluvial drainage channels is carried out, controlling the clogging and vegetation in them.

WATER RESOURCE PROTECTION PROGRAM

Groundwater monitoring subprogram

From the construction of the extraction well, a sampling of the resource extracted from the aquifer will be carried out in order to determine the base conditions and their variation over time. The objective of the monitoring will be to ensure the quality of the water extracted and at the same time determine that the extraction carried out does not affect the hydrogeological profile of the resource.

- Number of samples: 1.
- Sampling Point: underground water extraction well.
- Maximum admissible limits (LMA): s/Annex A of Law 11,220.

Parameter	Annual Frequency	Optional Analyzes
Turbidity	X	
Color	X	
Smell and taste	X	
Ph	X	
Total Alkalinity	X	
Total hardness		X
Chloride		X
Sulfate		X

Magnesium		X
Fluorine		X
Arsenic	X	
Lead		X
Nitrites	X	
Nitrates	X	
Ammonia		X
Iron		X
Total dissolved solids	X	
Conductivity	X	
Bacteriological: total aerobes, total coliforms, *Escherichia coli, Pseudomonas aeruginosa*	X	

AIR QUALITY REPORT

Worms Argentina S.A. has prepared a report with the objective of determine the concentration of Suspended Particulate Matter (PM10) and Hydrogen Sulfide in the air, in four (4) assigned monitoring posts, for a short measurement period (20 min).

The work has been carried out under standardized procedures, by trained personnel and through the use of equipment and instruments developed for this purpose. HSE Engineering guarantees the veracity of the information contained in this report and its confidentiality. The environmental regulation applicable to this monitoring report is the Resolution Nº 201/04 – Air quality guide levels for province of Santa Fe.

contaminants	C.A.P.C. (20 min) mg/m^3
particulate matter (PM10)	0.50
Hydrogen sulfide (H2S)	—

The methodologies applicated were:

- EPA1 Method IO-2.3: Reference standard for determining suspended particulate matter (such as PM10) for short monitoring periods (20 min.).
- Methods of Air Sampling and Analysis (Third Edition) - 701: Standard method for determination of hydrogen sulfide in the atmosphere.

Four SKC model 1700 air sampling equipment with a PM10 cyclone and an impingers system containing a capture solution for H2S were used.

MONITORING DESCRIPTION

The monitoring positions were recorded with the applicant. They were located around the plant, arranged as shown in the following image:

Figure 9. Monitoring positions for air quality at WORMS S.A. Source: Google Earth,

The equipment was installed and put into operation on 11/04/2021.

At the time of monitoring, the following data was recorded:

Temperature	Humidity	Pressure	Visibility	Win-Dir	Win - speed	Precipitation	Weather Conditions
28º	33 %	1003.73 HPa	14 Km/h	SO	9 Km/h	N/A	Partly cloudy

RESULTS

The results obtained are presented below:

PARAMETERS	Point 1 CA-01	Point 2 CA-02	Point 3 CA-03	Point 4 CA-04	UNIT	Guide Level *
particulate matter PM10	0.07	0.11	0.008	0.007	mg/m^3	0.50
Hydrogen sulfide (H_2S)	Not detected	Not detected	Not detected	Not detected	mg/m^3	-

** NOTE: Analysis Protocol No. 2254-2255-2256-2257 issued by the HSE Laboratory is attached.*

CONCLUSION

In accordance with the provisions of Resolution 201/04 of the Secretary of the Environment of the Province of Santa Fe, all the monitoring points of the Plant belonging to the company Worms Argentina S.A. - from the town of Arroyo Seco - COMPLY with the guide values established as maximum concentration in short periods (C.A.P.C.), for all the parameters analyzed: Suspended Particulate Matter and Hydrogen Sulfide (H_2S).

WATER QUALITY ANALYSIS

Worms Argentina S.A has prepared a report with the objective of determine and evaluate the concentration of the following parameters in the effluent: pH, color, conductivity, turbidity, solids in total suspension, bod, cod, total coliforms and fecal coliforms.

This report was prepared based on the results obtained from the monitoring carried out at the request of Worms Argentina S.A – Dry Creek (Sta. Fe). The work has been carried out under standardized procedures, by trained personnel and through the use of equipment and instruments developed for this purpose. HSE Engineering guarantees the veracity of the information contained in this document and its confidentiality.

The analytical determinations to which the water samples obtained from the monitored wells were subjected were selected as required by Law 11,220 Annex A, identical parameters and limits established in Provincial Resolution No. 1089/82 Annex A (Limits for the provision of drinking water). Said law provides for the regulation of service provision and provides for a system for the preservation of natural resources and the environment.

The purposes of this law are to guarantee the maintenance and promote the rehabilitation, improvement and development of the service throughout the province of Santa Fe, to establish the standards that ensure quality and efficiency levels consistent with the nature of the service, to establish an adequate legal framework that allows reconciling an efficient and effective provision of the service by providers, with the proper exercise of state powers related to the protection of the health interest, the welfare of the population, and the environment and natural resources throughout the province of Santa Fe.

The sampling methodology used is that recommended in the manual of Standardized Methods for the Analysis of Potable and Residual Water published by the APHA-AWWA-WEF1, 23rd edition. All analytical determinations are performed using international standardized methods.

Methods from the manual of Standardized Methods for the Analysis of Drinking and Wastewater published by the APHA-AWWA-WEF, 23rd edition, together with the EPA 481.1 standard, are currently used.

MONITORING DESCRIPTION

The sampling was carried out in the corresponding phreatic wells that the company has for this purpose. It was only possible to take samples from wells 1, 2, 6, 7 and 8, since the rest of the parameters were dry.

The following image shows the location of the water meters on the property, with their respective coordinates:

P4 (blanco)	33° 8'29.90"S; 60°32'18.30"O
P1	33° 8'35.00"S; 60°32'2.20"O
P2	33° 8'38.30"S; 60°32'9.40"O
P3	33° 8'31.60"S; 60°32'8.00"O
P5	33° 8'28.86"S; 60°32'6.10"O
P6	33° 8'33.29"S; 60°31'57.93"O
P7	33° 8'30.24"S; 60°31'53.03"O
P8	33° 8'26.91"S; 60°31'55.52"O

Figure 10. Location of the water meters on the property and theis respective coordinates. Source: Google Earth,

The sampling was carried out on 11/04/2021.

RESULTS

The results obtained by the analysis laboratory are presented below:

PARAMETERS	LC	UNIT	P1	P2	P6	P7	P8	LIMIT
Color	1	PI/Co	1					20
Conductivity	0,1	µS/cm	935	734	804	1701	805	-
BIOCHEMICAL DEMAND FOR OXYGEN (DBO)	10	mg/l	N/D	N/D	N/D	N/D	N/D	-
CHEMICAL DEMAND OF OXYGEN (DQO)	5	mg/l	N/D	N/D	N/D	N/D	N/D	-
PH	-	UpH	7,4					-

SOLIDS IN SUSPENSION TOTALS (SST)	1	mg/l	<1	<1	<1	<1	<1	-
Turbidity	1	UNT	<1					
FECAL COLIFORMS	2,2	NMP/100ml	<1,1	<1,1	<1,1	<1,1	<1,1	<2,2
TOTAL COLIFORMS	2,2	NMP/100ml	<1,1	<1,1	<1,1	<1,1	<1,1	<2,2

** NOTE: Analysis Protocol No. 2258-2259-2260-2261-2262 issued by the HSE Engineering Laboratory is attached.*

CONCLUSION

In accordance with the guide values established for the parameters legislated in Provincial Resolution No. 1089/82 Annex A (Limits for the provision of drinking water), the analytes are below said established limit values.

Likewise, groundwater is not used as a source of drinking water supply, but with its control it must be verified that there has been no impact on the water resource in relation to the inputs, raw materials and products used in the production. industrial activity developed in the complex.

Observing the results, it can be stated that there are no impacts that negatively affect the groundwater resource at the groundwater level.

9 Socio-economic aspects

In order to address the socio-economic aspects of the project activity, the tool “No Net Harm Environmental and Social Safeguards (NNH)” version 1.0 has been used to ensure that it does not cause ant net-harm to local communities and society in general.

The scale of the project does not threaten traditional uses or compromise any other activity in the area like agricultural or any other productive uses. There is also no risk of affecting other sectors because the main feedstock comes from industrial wastes, meaning that there is no other use or application for them.

The project scale also does not have a potential effect in generating migrations or displacements of local communities or compromising the livelihood of the surrounding areas, but instead is an opportunity or creating new jobs.

In order to monitored and ensure no negative effects on the local communities or society in general are takin place, Worms Argentina S.A. has formal and regular processes for gathering information from stakeholders (focus groups, surveys, community meetings, etc.) and has not received any negative feedback from them so far, in the other hand, is focusing in improving the positive impact in the community, the axes of the social policies are:

Donations

The donations are directed to those civil and / or commercial organizations of the town of Arroyo Seco since Worms Argentina S.A is committed to developing the local territory in which our production plant is located.

These social actors as important for the community as are clubs, schools, volunteer firefighters, community gardens, invite the community and companies to make their contribution either to, the continuity of its services and for building maintenance and purchase of new tools and machinery.
Currently, Worms Argentina S.A makes monetary donations to:

1. Volunteer Firefighters of the town of Arroyo Seco

New initiatives:

2. Orchard and community nursery in the town of General Lagos

The project consists of donating 400 kilos of compost monthly.

Who do we donate to?

For the eligibility of civil or commercial organizations receiving donations, they carry out a permanent survey of the organizations in the community and their needs, through:

- General mapping of social organizations and analysis of the areas they work with (impact areas) to evaluate which ones we identify with and begin to generate networks and joint projects.
- Periodic meetings to generate a close and trusting bond with them.

Supplier Policy, all suppliers adhere to the Supplier Code of Conduct, more than 80% of suppliers are National, spending on local suppliers is more than 60%, contributing to the improvement of socio-economic conditions in the Community.

Recruitment policy that prioritizes hiring local workers, currently going from 40% to 59% currently.

All of those maximize the positive effects of the project activity in local communities and also prevent the apparition of negative ones that could have gone unnoticed. It is also worth mentioning that the B Corp Certification that the company has includes socio

economic aspects like the ones already mention of donations and code of conduct for suppliers but also gender equality, safety and health conditions in the workspace and others.

10 Consultation with interested parties (stakeholders)

On different occasions Worms Argentina S.A. has signed agreements with facilities that produce non-hazardous organic waste, such as the Louis Dreyfus Company silver, to create the compost and be donated to the municipality of General Lagos Santa Fe (location where said LDC port terminal is located) for the use of the product in the maintenance of the trees and in tasks of reforestation and intervention in public spaces in an Inclusive + Sustainable Community agenda.

https://twitter.com/WormsSA/status/1539712528489537536?cxt=HHwWgICzzeGYlN4qAAAA

From a national point of view, the visit of the Minister of Productive Development of the Argentine Republic (Matias Kulfas) has been received at the facilities. He himself has declared that the circular economy is 1 of the 4 axes of the Green Productive Development Plan promoted by the Nation, being a plan to reduce the environmental impact of its productive activities and will allow the generation of more jobs.

https://twitter.com/KulfasM/status/1453851371195744256?cxt=HHwWgICyhdGHj60oAAAA
https://twitter.com/WormsSA/status/1453861053650120724?cxt=HHwWqMC5-Zy7k60oAAAA

He has also received a visit from the Minister of Production of the Nation (Daniel Schteingart) with his team, interested in the continuous improvements of his projects.

https://twitter.com/WormsSA/status/1363628583772635141?cxt=HHwWioCy1Zu-yuwlAAAA

An endless number of visits from different municipalities, councilors and deputies have also been received at the provincial level, seeing how it works and the need to see a company like Worms Argentina S.A in the fight against climate change.

https://twitter.com/WormsSA/status/1271927365594230785?cxt=HHwWgsC95ebM5aYjAAAA

It can be seen in the following Link, agreements, social training, visits to the representative plant of the Government of Argentina, etc.

https://twitter.com/wormssa

The company implemented a book of complaints and suggestions open to the community in the area where the non-hazardous organic waste processing plant is located.

10.1 Summary of comments received.

The origin of the waste is given by the large amount of non-hazardous organic waste from oil plants, cellulose, the dairy industry, breweries and agro-industries that produce in the Region to which Worms Argentina S.A A. belongs. (Province of Santa Fe and Buenos Aires, Argentina), for which reason said company is dedicated to specific tasks of environmental sanitation that seek to contribute to the development of a balance between society, the company, and the environment, for which it is responsible for investigating and provide viable solutions and sustainable solutions to complex problems such as non-hazardous solid waste. The processes are carried out manually by operators specifically trained by Worms Argentina S.A who prepare the mixture of the previously received and controlled waste. The destination of the compost obtained is used as organic fertilizer for gardens and plantations, thereby avoiding the production and emission of GHG and the poor reuse of organic waste that would have been produced by leaving it in a landfill emitting Methane.

Previously, the companies that generated this waste carried out the transfer to outsourced companies for its Final Disposal at a great distance from the destination. There the waste was artificially treated based on established standards. Subsequently, it was incinerated and disposed of in landfills, generating significant GHG emissions in its decomposition.

Given the situations referred to in the previous point, Worms Argentina S.A is highly regarded in its region due to the work it does to reduce environmental impact, and the need to have a plant of this nature in the region.

Therefore, by the surrounding municipalities, at the provincial and national level, the company has been encouraged to follow this path and continue with investments for new projects in the fight against climate change, which entails, in its main objectives, Health and Well-being, Quality Education, Gender Equality, Decent Work and Economic Growth, Renewal Industry and Infrastructure, Sustainable Cities and Communities, Responsible Consumption and Production and finally Climate Action.

10.2 Consideration of comments received.

The company maintains its way of working and continuously improves to continue in the fight against climate change, investing in technology to achieve its objectives; And the most important thing is that to date the company has no complaints from the neighboring population regarding the treatments it carries out without generating odors, which brings about social unrest.

11 Sustainable Development Objectives (SDG)

According to the SDG Tool provides by BioCarbon Registry, which is annexed to this PDD, this project is aligned with four SDG.

In the SDG tool (from BioCarbon) annexed to this PDD, the verification period is divided by two periods: ex ante (since 1/april/2018 to 31/march/2023) and expost (since 1/april/2023 to 31/march/2028).

- SDG 9. Industry, Innovation and Infrastructure: Promote inclusive and sustainable industrialization and, by 2030, significantly increase the share of industry in employment and gross domestic product, according to national circumstances, and double its share in least developed countries; by the creation of local and quality employment in an innovative project of a sustainable industries. Specificly, the contribution is in the global target 9.2, with indicator 9.2.2. Manufacturing emplyment as a porportion of total employment. The project involves the increase of propotion of local people employed (in total number of employees).

SDG, global target and project activity (UNIT)	VERIFICATION PERIOD	
	1/april/2018 to 31/march/2023	1/april/2023 to 31/march/2028
9.2. Proportion of local people employed in total number of employees(tons)	X	X

- SDG 11. Sustainable Cities and Communities: By 2030, reduce the per capita adverse environmental impact of cities, including by paying special attention to air quality and municipal and other waste management; The project activity consists of composting the organic fraction of the solid waste from agro-industrial plants into biocompost. So, the project activity requires the collection and use of solid waste. Specificly, the contribution is in the global target 11.6, indicator 11.6.1. Proportion of urban solid waste regulary collected and with adequate final discharge out of total urban solid waste generated, by cities. This contribution is quantified by the tons of solid waste trated by the project activity, wich is increased every year.

SDG, global target and project activity (UNIT)	VERIFICATION PERIOD	
	1/april/2018 to 31/march/2023	1/april/2023 to 31/march/2028
11.6 Quantity of the organic waste collected by the project activity (tons)	76,983.65	82,563.77

- SDG 12. Responsible consumption and production: By 2030, substantially reduce the generation of waste through prevention, reduction, recycling and reuse; The project activity consists of composting the organic fraction of the solid waste from agro-industrial plants into biocompost. So, the project follows the principle of reusing and recycling. Specificly, the contribution is in the global target 12.5, indicator 12.5.1. National recycling rate, tons of material recycled, because the project increases the use of a municipl waste and transform it in biocompost. So, the unit of measurement is the quantity of produced biocompost per year (tons).

SDG, global target and project activity (UNIT)	VERIFICATION PERIOD	
	1/april/2018 to 31/march/2023	1/april/2023 to 31/march/2028
12.5 Biocompost production (tons)	34.642,66	39.078,12

- SDG 13 - Climate action: Continue along the same path in the fight against climate change; The project involves reducing the emission of methane into the atmosphere from organic matter (from non-hazardous organic waste from biodiesel, oil and cellulose plants, the dairy industry, breweries and agro-industries that produce GHG) that otherwise they would have been left to decompose anaerobically in a solid waste disposal site (SWDS). Controlled aerobic treatment through biomass composting

is introduced in the project activity. Specificly, the project contributes to global target number 13.2. with the emission reduction of the project activity, because the project involves reducing the emissions of methane into the armosphere from organic matter. So, the activity unit of measurement is the tons of $CO_{2\,e}$ reduced by the project activity.

SDG, global target and project activity (UNIT)	VERIFICATION PERIOD	
	1/april/2018 to 31/march/2023	1/april/2023 to 31/march/2028
13.2 Emissions Reductions of the Project activity (t $CO_{2e)}$	59,565.97	63,732.66

12 REDD+ Safeguards (if applicable)

-0-

13 Special categories, related to co-benefits.

-0-

14 Grouped Project (if applicable)

-0-

15 Other GHG programs

-0-

16 Monitoring plan

The monitoring plan is designed to ensure that both the project process and all the data required to calculate the GHG mitigation are constantly updated and allow the project to be more efficient, detect possible problems or threats and implement contingency and improvement plans when required.

In order to keep the information updated the following parameters will be monitored:

Data and parameters available at the validation

Relevant data and parameters will be determined or available at validation as indicated in the tables below.

Data/Parameter 1

Data/Parameter	φ_y
Data unit	-
Description	Default value for the model correction factor to account for model uncertainties for year y
Source data	Methodological tool 4 "Emission from solid waste disposal sites" version 08.1.
Value applied	0,85
Justification of choice of data or description of measurement methods and procedures applied	As per table 2 (page 7) and table 1 (page 13) of the tool, the default value is applied for application B and in humid/wet conditions.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 2

Data/Parameter	f_y
Data unit	-
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
Source data	Methodological tool 4 "Emission from solid waste disposal sites" version 08.1.
Value applied	0
Justification of choice of data or description of measurement methods and procedures applied	The landfill sites where the waste had been deposited are unmanaged, so the value applied for f_y is 0.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 3

Data/Parameter	GWP_{CH4}

Data unit	t CO_2e/t CH_4
Description	Global Warming Potential of methane.
Source data	IPCC
Value applied	28
Justification of choice of data or description of measurement methods and procedures applied	Global warming potential of methane valid for the relevant commitment period.
Purpose of data	Determination of the baseline and determination of the project emissions.
Any comments	*https://ghgprotocol.org/sites/default/files/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_0.pdf*

Data/Parameter 4

Data/Parameter	***OX***
Data unit	-
Description	Oxidation factor (reflecting the amount of methane from SWDS that is oxidized in the soil or other material covering the waste)
Source data	Based on an extensive review of published literature on this subject, including the IPCC 2006 Guidelines for National Greenhouse Gas Inventories and Methodological tool 4 "Emission from solid waste disposal sites" version 08.1.
Value applied	0,10
Justification of choice of data or description of measurement methods and procedures applied	As per table 2 (page 7) and table 2 (page 14), for applications A and B, the default value of OX is 0,1.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 5

Data/Parameter	***F***
Data unit	-
Description	Fraction of methane in the SWDS gas (volume fraction)

Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	0,5
Justification of choice of data or description of measurement methods and procedures applied	As per table 2 (page 7) and table 3 (page 14), for applications A and B, the default value of F is 0,5.
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 6

Data/Parameter	$DOC_{f,y}$
Data unit	weight fraction
Description	Fraction of degradable organic carbon (DOC) that decomposes under the specific conditions occurring in the SWDS for year y (weight fraction)
Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	0,5
Justification of choice of data or description of measurement methods and procedures applied	As per para 18, table 2 for application B, and table 4 (page 14) in the case of MSW, default value is established by IPCC Guidelines for National GGI.
Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 7

Data/Parameter	$\boldsymbol{MCF_y}$
Data unit	-
Description	Methane correction factor for year y
Source data	Methodological tool 4 “Emission from solid waste disposal sites” version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.

Value applied	1
Justification of choice of data or description of measurement methods and procedures applied	As per para 18, table 2, for application B, considering SWDS without a water table above the bottom of the SWDS, the default values (based on SWDS type) for MCF_y is 1, as per table 5 (page 15), for anaerobic managed solid waste disposal sites.
Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 8

Data/Parameter	DOC_j
Data unit	-
Description	*Fraction of degradable organic carbon in the waste type j (weight fraction)*
Source data	Methodological tool 4 "Emission from solid waste disposal sites" version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	15%
Justification of choice of data or description of measurement methods and procedures applied	*As per table 6 (pages 15 and 16), this value is applied for "Food, food waste,beverages and tobacco (other than sludge)".*
Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 9

Data/Parameter	k_j
Data unit	1/yr
Description	Decay rate for the waste type j (1/yr)
Source data	Methodological tool 4 "Emission from solid waste disposal sites" version 08.1. and IPCC 2006 Guidelines for National Greenhouse Gas Inventories.
Value applied	0,185

Justification of choice of data or description of measurement methods and procedures applied	As per table 7 (page 17), for rapidly degrading waste (food, food waste, beverages and tobacco) and boreal and temperate (MAT ≤ 20ºC), Wet (MAP/p ET > 1), the value is 0,185 1/yr.
Purpose of data	Determination of the baseline
Any comments	-

Data/Parameter 10

Data/Parameter	***y***
Data unit	year
Description	Year of the crediting period for which methane emissions are calculated (y is a consecutive period of 12 months)
Source data	Standard BCN ap 10.5
Value applied	10
Justification of choice of data or description of measurement methods and procedures applied	The crediting period for energy, waste, and other product use projects is 10 years, since 1/april/2018 to 31/march/2028
Purpose of data	Determination of the baseline.
Any comments	-

Data/Parameter 11

Data/Parameter	$EF_{EF,j,y}$
Data unit	*t CO_2/MWh*
Description	Emission factor for electricity generation for source j in year y
Source data	Methodological tool 5 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation“(version 3).

<table>
<tr><td>Value applied</td><td>
<table>
<tr><td>PERIOD / YEAR</td><td>1
1/april/2018-31/march/2019</td><td>2
1/april/2019-31/march/2020</td><td>3
1/april/2020-31/march/2021</td><td>4
1/april/2021-31/march/2022</td><td>5
1/april/2022-31/march/2023</td></tr>
<tr><td>$EF_{,EF,j,y}$ (t CO_2/MWh)</td><td>0,2815</td><td>0,271</td><td>0,2835</td><td>0,28185</td><td>0,25135</td></tr>
</table>

For the estimation period since 1/april/2023 to 31/march/2028, the value for $EF_{EF,,j,y}$ is the same as for year 2023, 0,231 t per year.
</td></tr>
<tr><td>Justification of choice of data or description of measurement methods and procedures applied</td><td>Based on the information from the Argentine Government: https://www.argentina.gob.ar/economia/energia/energia-electrica/estadisticas ;https://cammesaweb.cammesa.com/download/factor-de-emision/., the emission factor is an average of each years for the period.
<table>
<tr><td></td><td>2018</td><td>2019</td><td>2020</td><td>2021</td><td>2022</td><td>2023</td></tr>
<tr><td>$EF_{,EF,j,y}$ (CO_2t/MWh)</td><td>0,296</td><td>0,267</td><td>0,275</td><td>0,292</td><td>0,2717</td><td>0,231</td></tr>
</table>
</td></tr>
<tr><td>Purpose of data</td><td>Determination of the project emissions</td></tr>
<tr><td>Any comments</td><td>-</td></tr>
</table>

Data/Parameter 12

Data/Parameter	***TDLj,y***
Data unit	-
Description	Average technical transmission and distribution losses for providing electricity to source j in year y
Source data	IEA Statistics OECD/IEA 2018.
Value applied	15%

Justification of choice of data or description of measurement methods and procedures applied	Based on The Wolrd Bank stadistics (IEA), the electric power transmisión and distribution losses (% of outputs) in Argentina is 15.% https://data.worldbank.org/indicator/EG.ELC.LOSS.ZS
Purpose of data	Determination of the project emissions
Any comments	-

Data/Parameter 13

Data/Parameter	$EF_{FC,default}$
Data unit	Tons of CO_2 per liters (tCO_2/L)
Description	Emission factor of diesel in year y
Source data	Govern of Argentina
Value applied	0,00261
Justification of choice of data or description of measurement methods and procedures applied	Based on dates from the Goverment of Argentina: "Emisiones de CO_2 calculadas a partir de las ventas al público de combustibles líquidos en EESS- año 2018"
Purpose of data	Determination of the project emissions
Any comments	-

Data/Parameter 14

Data/Parameter	$EF_{CH4,y}$
Data unit	$t\ CH_4 / t$
Description	Emission factor of methane per tonne of waste composted valid for year *y*
Source data	Methodological tool 13 "Project and leakage amissions from composting" version 2.0.
Value applied	0,002
Justification of choice of data or description of measurement methods and procedures applied	As per table 2, page 11 from the tool, $EF_{CO4,y}$ (option 2) is a default value. The emission factor was selected based on studying published results of emission measurements from composting facilities, literature reviews on the subject and published emission factors. Data from recent, high quality sources was analyzed and a value conservatively selected from the higher end of the range in results.

Purpose of data	Determination of the project emissions.
Any comments	-

Data/Parameter 15

Data/Parameter	$EF_{N2O,y}$
Data unit	*t N_2O/ t*
Description	Emission factor of nitrous oxide per tonne of waste composted valid for year *y*
Source data	Methodological tool 13 "Project and leakage amissions from composting" version 2.0.
Value applied	0,0002
Justification of choice of data or description of measurement methods and procedures applied	As per table 3, page 12 from the tool, $EF_{N2O,y}$ (option 2) is a default value. The emission factor was selected based on studying published results of emission measurements from composting facilities, literature reviews on the subject and published emission factors. Data from recent, high-quality sources was analyzed and a value conservatively selected from the higher end of the range in results.
Purpose of data	Determination of the project emissions.
Any comments	-

Data/Parameter 16

Data/Parameter	GWP_{N2O}
Data unit	t CO_2e/t N_2O
Description	Global Warming Potential of nitrous oxide.
Source data	IPCC
Value applied	265
Justification of choice of data or description of measurement methods and procedures applied	Global warming potential of nitrous oxide valid for the relevant commitment period.
Purpose of data	Determination of the project emissions.
Any comments	*https://ghgprotocol.org/sites/default/files/Global-Warming-Potential-Values%20%28Feb%2016%202016%29_0.pdf*

Data and parameters monitored.

Relevant parameters will be monitored during the crediting period as indicated in the tables below.

Data/Parameter 17

Data/Parameter	$W_{j,x}$				
Data unit	t				
Description	Amount of solid waste type j prevent from disposal in the SWDS in year x				
Source data	Measurements by project holder.				
Value applied	Since the measurement of the amount of solid waste has an 2% of uncertainly, the final values applied are above,				
	1 /april/2018-/march/2019	2 1/april/2019-31/march/2020	3 1/april/2020-31/march/2021	4 1/april/2021-31/march/2022	5 1/april/2 31/march
	12,292.56	16,857.45	14,177.14	17,143.75	16,512
	For the estimation period since 1/april/2023 to 31/march/2028, the value for $W_{,y}$ is the same as for period number 5 (1/april/2022-31/march/2023), 16,591.93 tons per year.				
Justification of choice of data or description of measurement methods and procedur	According to paragraph 25, of the methodological tool 4 "*Emissions from solid waste disposal sites. Version 08.1*" "in case that only one type of waste is disposed, then $W_{j,x,} = W_x$ and $W_{x,} = W_{i.}$" And, as per table 11 (page 19), for application B this parameter is the total amount of waste disposed in a SWDS in year x and its data source are the measurements of the project holder.				

es applied	
Purpose of data	Determination of the baseline
Monitoring frequency	Monitored continuously with the entrance of each truck at the plant.
Any comments	-

Data/Parameter 18

Data/Parameter	Q_y
Data unit	t
Description	Quantity of waste composted in year y
Source data	Measurements by project holder.
Value applied	Since the measurement of the amount of solid waste has an 2% of uncertainly, the final values applied are above

PERIOD / YEAR	1 1/april/2018-31/march/2019	2 1/april/2019-31/march/2020	3 1/april/2020-31/march/2021	4 1/april/2021-31/march/2022	5 1/april/2022-31/march/2023	TOTAL (t)
Q_y (t)	12,292.56	16,857.45	14,177.14	17,143.75	16,512.75	76,983.65

For the estimation period since 1/april/2023 to 31/march/2028, the value for $W_{,y}$ is the same as for period number 5 (1/april/2022-31/march/2023), 16,512.75 tons per year.

Justification of choice of data or description of measure	According to paragraph 14, of the methodological tool 13 "*Project and leakage emission from composting*", option 1, the composting installation monitor the weight of waste delivered using an on-site weighbridge or any other applicable and calibrated weighing device. So, Qy and W_j has the save values.

ment methods and procedures applied	
Purpose of data	Determination of the project emissions.
Monitoring frequency	Monitored continuously with the entrance of each truck at the plant.
Any comments	-

Data/Parameter 19

Data/Parameter	$FC_{,i,y}$
Data unit	Liters per year
Description	Fossil fuel consumption
Source data	Measurements by project holder.
Value applied	<table><tr><td>PERIOD / YEAR</td><td>1 1/april/2018-31/march/2019</td><td>2 1/april/2019-31/march/2020</td><td>3 1/april/2020-31/march/2021</td><td>4 1/april/2021-31/march/2022</td><td>5 1/april/2022-31/march/2023</td></tr><tr><td>FC (L)</td><td>12,174.80</td><td>20,528.73</td><td>17,923.14</td><td>19,959.50</td><td>34,699.79</td></tr></table> For the estimation period 6-10, the results of FC are the same as for period 5 per year (34,699.79 litters per year)
Justification of choice of data or description	As per page 15 of the methodology AM0057 and table 1 (page 5) the Methodological tool number 3 “Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion” (version 3), these parameters are measured by the project holder continuously.

of measurement methods and procedures applied	
Purpose of data	Determination of the project emissions.
Monitoring frequency	Monitored continuously with the invoice of fuel consumption by the supplier.
Any comments	-

Data/Parameter 20

Data/Parameter	$EC_{PJ,j,y}$
Data unit	MWh/yr
Description	Quantity of electricity consumed by the project electricity consumption source j in year y
Source data	Methodological tool 5 “Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation” (version 3).
Value applied	PERIOD/ YEAR: 1 1/april/2018-31/march/2019; 2 1/april/2019-31/march/2020; 3 1/april/2020-31/march/2021; 4 1/april/2021-31/march/2022; 5 1/april/2022-31/march/2023 $EC_{PJ,j,y}$ (MWh): 16.75; 19.50; 21.25; 22.50; 20.00 For the estimation period since 1/april/2023 to 31/march/2028, the value for $EF_{EF,,j,y}$ is the same as for period 5, 20.00 MWh per year.
Justification of choice of data or description of measurement	As per table 10, pages 20 and 21 from the tool, the quantity of electricity consumption are measured by the project holder continuously.

methods and procedures applied	
Purpose of data	Determination of the project emissions
Monitoring frequency	Monitored continuously with the invoice of electricity consumption by the supplier.
Any comments	

SDG and Risk monitoring

The monitoring of the SDGs will be carried out in relation to the tool based on the Registration format of the BioCaron Registration Platform called SDG Tool. The monitoring of Social, environmental and economic Risks according to the tool: BCR project activities do not cause any net-harm to the environment or to local communities and society in general. Attached is the monitoring plan for the BioCarbon format (BCR_Monitoring-Report-Format), with the file name BCR_Monitoring-Report-solid2023 and the file SDG-Tool-2023-Worms Solid.

Relevant SDG Indicator	**SGD 9: Industry, innovation and infrastructure**
Unit	Not Applicable
Description	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation
Source of data	Chief operating officer
Purpose of monitoring	Fulfilment of SDG 9
Monitoring Frecuency	Annual
Relevant SDG Indicator	SGD 11: sustainable cities and communities
Unit	Not Applicable
Description	Make cities and human settlements inclusive, safe, resilient and sustainable

Source of data	Chief operating officer
Purpose of monitoring	Fulfilment of SDG 11
Monitoring Frecuency	Annual
Relevant SDG Indicator	**SGD 12: responsable production and consumption**
Unit	Not Applicable
Description	Ensure sustainable consumption and production patterns.
Source of data	Chief operating officer
Purpose of monitoring	Fulfilment of SDG 12
Monitoring Frecuency	Annual

Relevant SDG Indicator	**SGD 13: Climate Action**
Unit	Not Applicable
Description	Take urgent action to combat climate change and its impacts
Source of data	Chief operating officer
Purpose of monitoring	Fulfilment of SDG 13
Monitoring Frecuency	Annual
Indicator	Natural Risks
Unit	Not Applicable
Description	Identification of potential natural and anthropogenic risks that GHG mitigation actions may face and determine the necessary measures to mitigate said risks.
Source of data	Chief operating officer
Purpose of monitoring	Compliance Monitoring Of natural risks
Monitoring Frecuency	Annual

Indicator	**Financial Risks**
Unit	Not Applicable
Description	Identify potential financial risks related to expected costs and investments, as well as project cash flows and define measures to mitigate financial risks.
Source of data	Chief operating officer
Purpose of monitoring	Compliance Monitoring Of Financial Risks
Monitoring Frecuency	Annual

Indicator	**Social Risks**
Unit	Not Applicable
Description	Determine medium and short-term risks associated with the participation of local communities and interested parties in the proposed activities.
Source of data	Chief operating officer
Purpose of monitoring	Compliance Monitoring Of Social Risks
Monitoring Frecuency	Annual